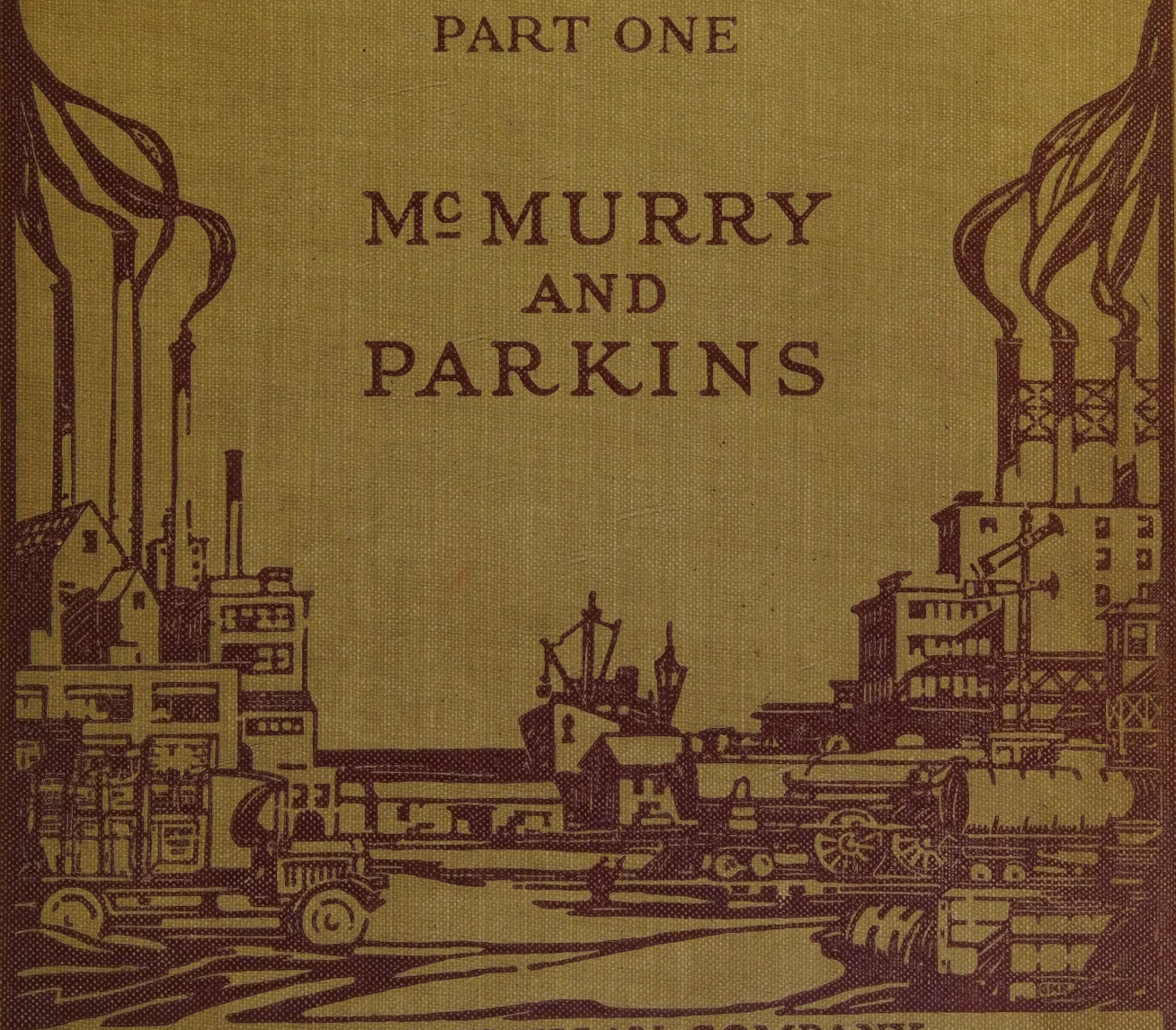
ADVANCED GEOGRAPHY

PART ONE

McMURRY
AND
PARKINS



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ADVANCED GEOGRAPHY

PART ONE

The giant sequoias of California

Locate the Sequoia National Park in Fig. 175.

ADVANCED GEOGRAPHY

PART ONE

BY

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PREFACE

A new textbook in geography should represent an advance in both content and method, in what is presented and how it is presented; for both the science of geography and the science of teaching have made strides forward within the past few years.

Human geography

One of the principles adopted by one of the authors many years ago, in the first series of geographies bearing his name was that for elementary schools the study of geography should be confined to the topics that have the most important human relationships. The humanizing of school geography seemed to him a useful contribution. In this volume, of course, the same principle is fundamental.

New geographic conditions

The work of man has modified the geography of many countries in recent years. New conditions have developed that have changed the products of large areas and the occupations of many people. For instance, while the rubber industry has developed enormously within the last decade, Brazil no longer furnishes any large part of our crude rubber supply; this comes mainly from the Orient. A world war has altered boundaries, brought out obscured peoples, created new states. The authors have used a great variety of sources to secure the most reliable information about this new world of to-day.

Moreover, some geographic conceptions have changed in the light of recent scientific research. The factors of climate and the relations of climate to life have been more carefully investigated. Climatic belts rather than zones and isotherms are now used by geographers. In this new book advantage has been taken of the contributions of modern geographic study.

Practical regional treatment

Geographic regions have been carefully delimited, to bring into harmony scientific conceptions and teaching possibilities. In elementary schools only major regions can be treated. As a basis for regional treatment we have selected no one "control," such as geological formation, and used that exclusively; we have tried to select units that are well recognized and that it will be really useful for the pupil to distinguish, to make the division truly regional by using large areas where living conditions are essentially similar. In regional divisions, moreover, text and maps are in harmony. Each region has some dominant geographic factor or factors; in our treatment these are emphasized, whether physiographic, industrial, or racial. We have tried to lay the emphasis in each case where it belongs.

Organization for modern teaching methods

The crying need in geography in recent years has been to get away from the encyclopedic presentation of facts. The authors of this volume have accepted this demand, and have accordingly endeavored to prepare a text that fits modern educational theory and the best teaching practice.

The encyclopedic treatment makes a list of topics—such as location, surface features, climate, products, etc.,—the centers of attention, and offers under each heading whatever facts the specialist in the field thinks valuable. It largely ignores the relative value of facts

and their bearing on the child. Its point of view is that of the well-informed scientist who imposes upon the learner whatever facts the latter's distant future good may seem to require.

In contrast, modern educational theory makes the learner's present interests and needs the starting point in instruction. It demands that, in a field like geography, those problems which have general value and which are so intimately related to the child as to promise to make a strong appeal to him, be first sought out. Then the facts necessary for their solution should be offered. In short, modern theory demands that a geography be not a small encyclopedia but a volume of coherent literature.

This text, therefore, is a series of such problems, with their answers—the best problems that the authors could conceive, after having made as extensive a study of the interests and needs of the children as of the geographic facts themselves. The problems are stated in the margins of the pages. They are the leading feature in the organization of the book.

Some of the merits of such a treatment are found in its influence on children's methods of study. Everyone knows how bad those methods are; but not everyone realizes that they are largely the result of the influence of textbooks.

Relation of the text to improvement in methods of study

Good study or good thinking requires, first, that live questions be raised for consideration; then, that facts be collected, evaluated, and organized until forceful and valuable conclusions are reached. That is what all efficient people in active life do when they "think"; and one of the chief duties of the school is to accustom children to that procedure.

This text attempts to accomplish this end by furnishing abundant examples of clear thinking. The present habits of study prove the power of a bad example; for the encyclopedic treatment has made study consist chiefly of the collection and reproduction of facts. A good example may, conversely, be relied upon to exert a beneficial influence.

Not only may this text be expected to give insight into better methods of work, but it may be expected to give abundant practice in such methods as well. More than that, to the extent that it approaches literature it will tend to stimulate further thought, as literature does; it will lead children to raise and answer questions of their own through the suggestions they see "between the lines."

The organization of the subject matter of this book into units consisting of problems and their answers; the many proposed questions for independent study, found at the end of each section and accompanied by references to data; and the practical suggestions here and there on how to study—all these provisions indicate how important an agency for improving methods of study the authors believe a textbook should be.

One of the serious difficulties in class instruction is to adapt assignments to children of different abilities. In this volume the main text covers the minimal essentials of the subject. Every normal child can be expected to go so far at least. Children of more than average ability, however, are encouraged to do more by solving some of the proposed problems for independent study. Inasmuch as reference work in libraries, compositions, debates, interviews, the writing of advertisements, etc., are included among these problems, provision is made for a wide variety of tastes and abilities. By the aid of these suggestions some

Adaptation of the text to children of different abilities

children may be led to do twice as much work in the course as some others.

The difference between this text and the Elementary Geography

A just complaint against series of school geographies has been that the two books were too nearly alike in content. In this series the point of view in the second volume is very different from that of the first; it is industrial and commercial rather than descriptive. The nature of the problems treated is, therefore, radically different.

The advances represented by the maps

The maps show several important advances over maps of the past. In the first place, while both political and physical maps of the customary sort are provided for each continent, there is also a map for each large subdivision of a continent that brings together all the features studied; *i. e.*, that contains the political, physical, and cultural elements combined. By this means the elevations, political boundaries, railroads and highways, canals, and cities can be more easily seen and studied in their relations to one another. More detailed maps, for supplementary use only, have made it possible to avoid the usual confusion between school geography and atlas in the maps illustrating the text. Simple maps in black and white have been introduced in great abundance whenever specific topics pertaining to each region could thus be explained to advantage.

Our obligations should be acknowledged to the several engravers and artists whose work has resulted in the provision of maps of a new type; to the publishers and their editors, who have spared no effort or expense; and to the many others who have kindly coöperated by furnishing material or reviewing manuscript or proof in various stages.

F. M. McMurry
A. E. Parkins

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PART I. NORTH AMERICA

I. The Story of Our Continent

Some of the changes in our continent, and how we know about them. — It is supposed that the Indians first reached North America by crossing Bering Strait from Asia, and that from Alaska they gradually spread over the entire continent. They must have lived here many, many hundreds of years before the white men came.

The long ages required for such changes

Since their first appearance on the continent, it is certain that its outline and surface features have remained very nearly the same. The rivers have cut their valleys and changed their courses slightly, some lakes have been dried up or reduced to marshes, and the coast line has been somewhat altered. Yet, if the first Indians who came here had made as accurate maps as we now make, a comparison of such maps with ours would show exceedingly slight changes.

Nevertheless, the continent has not always been as it is to-day. Areas that are now land have once, or even several times, been under the sea; areas that are now beneath the sea were once land; where now there are plains, lofty mountains once stood; and some of our plateaus were once low plains. The fact that the continent has changed so slightly during the many hundreds of years since the arrival of the Indians suggests what ages it must have required to bring about these enormous changes. Certainly it took millions of years.

How do we know these facts? They have been learned by a careful study of the rocks and surface features. Although many questions can be asked that no man is yet able to answer, the outline of the story of our continent is fairly well known.

Many times the sea has covered a large part of the continent. Wherever there is a sea, material is being deposited along its edges as sand, mud, or ooze. Can you suggest where it comes from? These deposits — called sediment — gradually harden into rock, forming sandstone, shale, or limestone, which are very common. Since these rocks are formed from sediment, they are called *sedimentary* rocks.

How certain kinds of rock have been formed, and their distribution

Fig. 3 shows the distribution of the sedimentary rocks of North America, where they appear at or near the surface of the earth. Their presence in any area indicates that that area was once beneath the sea. How much of the whole surface of

---

Questions on Fig. 1. — 1. Find out from Fig. 215 where the Panama Canal is situated. Could this canal have been dug if the elevation of the Isthmus of Panama were such as to be shown in brown on this map? Point out on this map two other possible routes for a canal joining the Pacific and Atlantic oceans. 2. Trace a route lying entirely through lowlands from the Gulf of Mexico to the Arctic slope. 3. Do you estimate that more or less than half the area of North America has a greater elevation than 2,000 feet? 4. Does any statement on p. 9 help to explain why it is that Greenland is shown here in brown?

NORTH AMERICA
PHYSICAL MAP
Scale of statute miles
0 100 200 400 600 800 1000
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
Sea level to 1000
Below sea level
DEPTHS IN FEET
Sea level to 5000
Below 5000
Longitude West from Greenwich
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
WEST INDIES
GREENLAND
BAFFIN BAY
HUDSON BAY
ROCKY MOUNTAINS
GREAT PLAINS
GREAT BASIN
COLORADO PLATEAU
CENTRAL LOWLAND
ATLANTIC COASTAL PLAIN
GULF COASTAL PLAIN
APPALACHIAN HIGHLAND
THE GREAT LAKES
Mt. McKinley 20,300 Ft.
Mt. Logan 19,850 Ft.
Mt. St. Elias 18,000 Ft.
Mt. Rainier 14,408 Ft.
Mt. Hood 11,225 Ft.
Mt. Whitney 14,515 Ft.
Pikes Peak 14,110 Ft.
Popocatepetl 17,250 Ft.
Mt. Orizaba
Mt. Washington 6,274 Ft.
Mt. Mitchell 6,711 Ft.
Bering Sea
Tropic of Cancer
Arctic Circle
Yukon R.
Mackenzie R.
Great Bear Lake
Great Slave Lake
Lake Athabaska
Peace R.
Saskatchewan R.
Lake Winnipeg
Nelson R.
James Bay
Hudson Strait
Davis Strait
Baffin Land
Melville Sound
Beaufort Sea
Pt. Barrow
Bering Strait
Dease Inlet
Coronation Gulf
Queen Charlotte Islands
Vancouver I.
C. Flattery
Columbia R.
C. Mendocino
San Francisco Bay
C. Conception
C. San Lucas
Gulf of California
Lower California Pen.
Sierra Madre
Rio Grande
Red R.
Arkansas R.
Ozark Plateau
Ohio R.
Missouri R.
Platte R.
Mississippi R.
Lake Superior
Lake Michigan
Lake Huron
L. Erie
L. Ontario
St. Lawrence R.
Gulf of St. Lawrence
Labrador
Newfoundland
Cape Race
Cape Sable
Cape Cod
Cape Hatteras
Delaware Bay
Chesapeake Bay
Bermuda Islands
Sargasso Sea
Florida Strait
Bahama Islands
Peninsula of Florida
Cuba
Haiti
Porto Rico
Jamaica
Greater Antilles
Yucatan Channel
Peninsula of Yucatan
Gulf of Campeche
Isthmus of Tehuantepec
Lake Nicaragua
Isthmus of Panama
Gulf of Panama
South America
Denmark Strait
Iceland
C. Farewell
C. Chidley
Strait of Belle Isle
Newfoundland
Highland
Laurentian Highland
Coastal Plain
Peninsula of Nova Scotia
Bermuda Islands
Williams Engraving Co. N.Y.

Fig. 1

NORTH AMERICA
POLITICAL MAP
Scale of statute miles
0 100 200 400 600 800 1000
Capitals of Countries ⊙
Railroads
WILLIAMS ENGRAVING CO., N.Y.
Longitude West from Greenwich
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO
CARIBBEAN SEA
GREENLAND
(To Denmark)
ICELAND
BAFFIN BAY
Davis Strait
Denmark Strait
HUDSON BAY
Hudson Strait
C. Farewell
C. Chidley
LABRADOR
(To Newfoundland)
Strait of Belle Isle
NEWFOUNDLAND
St. Johns
C. Race
Gulf of St. Lawrence
Bering Sea
Bering Strait
ASIA
C. Dezhnev
Pt. Barrow
Nome
C. Prince of Wales
ALASKA
Yukon R.
Fairbanks
Mt. McKinley
Seward
Arctic Circle
North Magnetic Pole
Great Bear Lake
Great Slave Lake
Mackenzie R.
Dawson
Mt. St. Elias
Mt. Logan
Juneau
Coast Range
Lake Athabaska
Nelson R.
James Bay
Prince Rupert
QUEEN CHARLOTTE ISLANDS
VANCOUVER I.
KODIAK I.
CANADA
Edmonton
Lake Winnipeg
Winnipeg
Victoria
Vancouver
C. Flattery
Seattle
Tacoma
Spokane
Columbia R.
Mt. Rainier
Portland
Mt. Hood
Cascade Range
Duluth
Lake Superior
Quebec
Montreal
Ottawa
Lake Ontario
Toronto
Lake Huron
Boston
C. Cod
C. Sable
Halifax
St. Lawrence R.
Laurentian Highlands
Minneapolis
St. Paul
Milwaukee
Lake Michigan
Detroit
Lake Erie
Buffalo
New York
Philadelphia
Chicago
Cleveland
Pittsburgh
Baltimore
Washington
Chesapeake Bay
Norfolk
C. Hatteras
BERMUDA ISLANDS (Br.)
C. Mendocino
Mt. Shaska
Great Salt Lake
Sierra Nevada
San Francisco
Los Angeles
San Diego
Mt. Whitney
Colorado R.
Denver
Pikes Peak
Rocky Mts.
UNITED STATES
Kansas City
St. Louis
Missouri R.
Ohio R.
Cincinnati
Louisville
Appalachian Mts.
Memphis
Arkansas R.
Mississippi R.
Atlanta
Charleston
Savannah
Jacksonville
Florida Strait
Key West
Havana
CUBA
WEST INDIES
BAHAMA ISLANDS (Br.)
I. OF HAITI
HAITI
DOMINICAN REPUBLIC
Port au Prince
San Juan
Santo Domingo
PORTO RICO (U.S.)
JAMAICA (Br.)
Kingston
GREATER ANTILLES
Yucatan Channel
Gulf of Campeche
Tropic of Cancer
C. San Lucas
Gulf of California
Rio Grande
Dallas
El Paso
Houston
San Antonio
Galveston
New Orleans
Red R.
MEXICO
Mexico
Popocatepetl
Mt. Orizaba
Vera Cruz
Tampico
REVILLAGIGEDO ISLANDS
Acapulco
Salina Cruz
Belize
BRITISH HONDURAS
FEDERATED REPUBLIC OF CENTRAL AMERICA
Tegucigalpa
Guatemala
San Salvador
NICARAGUA
Managua
COSTA RICA
San Jose
Panama Canal
Panama
Colon
CENTRAL AMERICA
SOUTH AMERICA

Fig. 2

Questions on Fig. 2. — 1. Is your home included in the area covered by this map? If so, show where it is. 2. Compare this map with Fig. 1 to find out whether railroads occur more often in highlands or lowlands. 3. Are there more large cities in lowlands than in highlands? 4. How many cities shown on this map are not on any waterway?

North America seems to be included? Locate such areas as accurately as you can. The rock that has probably never been under the sea we call old rock. What sections contain chiefly old rock?

In the western part of North America, from Central America to Bering Sea, there is a great variety of rocks. Some are old rock, like granite; some are sedimentary; but most of them are *lavas*, having come in a molten state from volcanoes, and for that reason they are often called *igneous* or fire rocks.

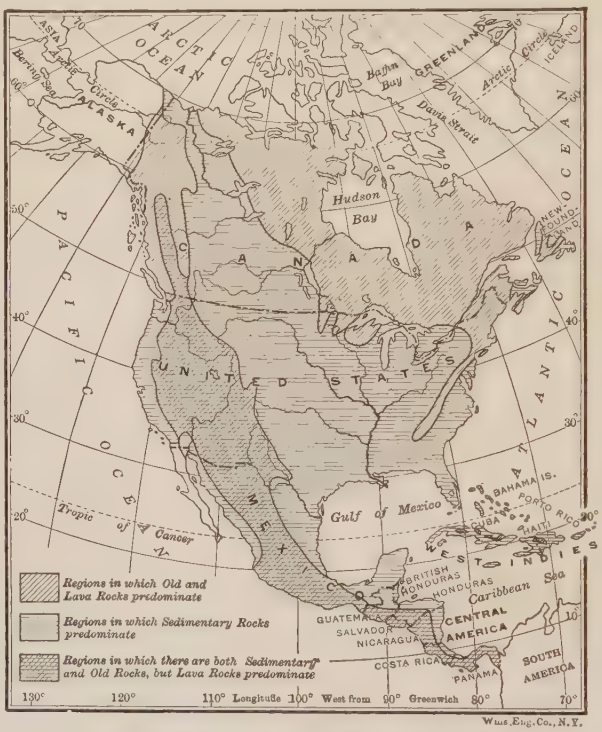

Fig. 3. — The rocks of North America

What minerals are usually associated with old and lava rocks? In what class is coal found? Limestone, used in making lime and cement and in building construction, is a sedimentary rock. Since the rock regions of Alaska are somewhat complex, no attempt is made to show them here.

Importance of this distribution

It is important to remember the distribution of the several kinds of rock, because certain valuable materials are found with certain kinds. Coal, oil, and gas, for example, are found in sedimentary rocks. Gold and silver, copper, and nickel are found in old rock or igneous rock. Lead sometimes accompanies silver. In our country, however, the more important lead and zinc deposits are in regions of sedimentary rock. Much of our iron ore was probably first associated with igneous rock, but has been washed out of that and collected into beds or seams in sedimentary rock. Thus the kind of rock suggests the kind of metal, if any, that we may expect to find in it.

The Coal Period. — One of the most interesting periods in the history of the continent was that during which the plant remains were deposited from which our coal has been formed. There is good proof that coal is made of plant remains. Roots of plants may still be seen in the old soil, now changed to rock, that lies beneath the coal beds; and stems of plants and even trunks of trees, changed to coal, are found in the coal beds. Besides, with a microscope, or at times even with the naked eye, one can see that coal is made of bits of plants pressed closely together. Sometimes the full form, or *fossil*, of a fern or leaf may be seen.

What coal is made of

As the crust of the earth slowly shrank and wrinkled, the land was raised and lowered. Even now it is slowly moving in some places, just as it was during the Coal Period. At that time parts of the old sea bottom were raised above

How coal beds were formed, and their distribution

the water, forming extensive plains in the eastern part of North America. Those plains were so low and level that vast swamps were formed, in which vegetation grew. It was probably much warmer here at that time than now, and the rains were far heavier. In consequence, the vegetation was very rank, as in a tropical jungle. Possibly it was even much ranker than that found to-day in the sea, and layers of mud, sand, and gravel collected over them. These have since been hardened into layers of rock, making sedimentary rock, previously mentioned; and the vegetation beneath them has been changed, by the pressure of the layers of rock above them, into coal. After another long period the sea bottom was raised once more, and dense swamp vegetation

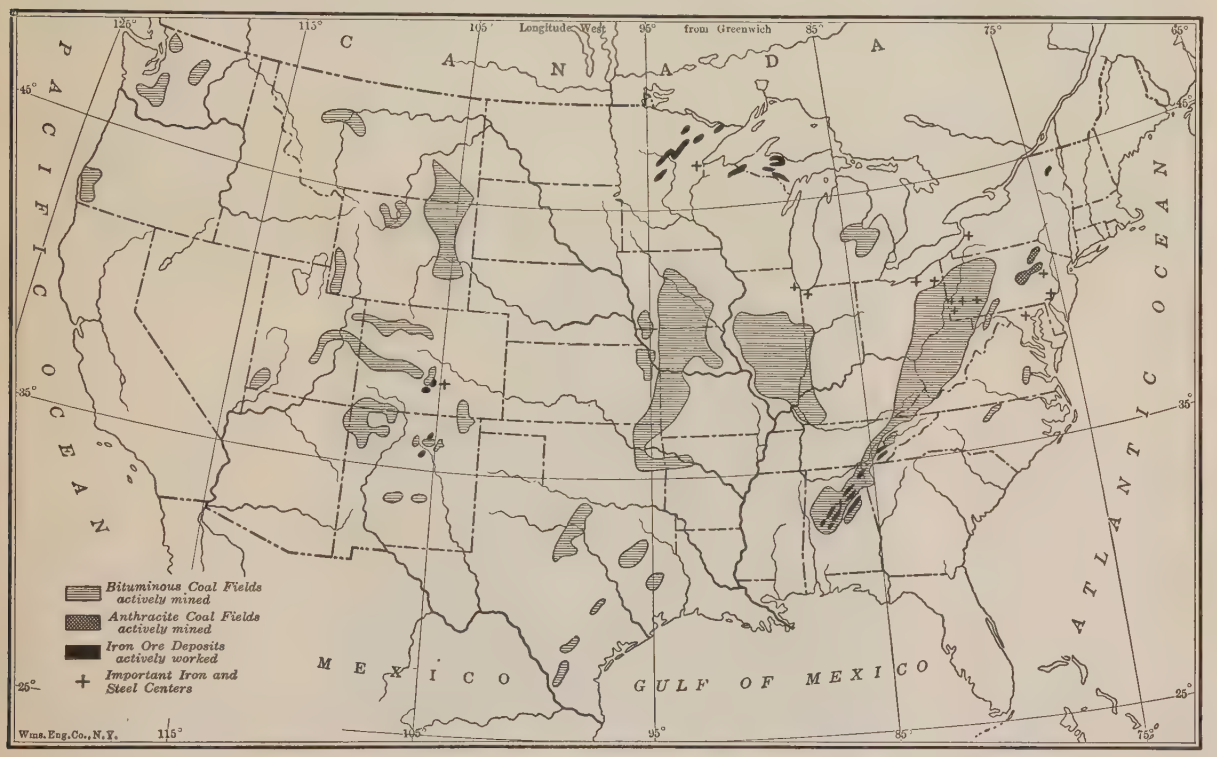
Longitude West from Greenwich
C A N A D A
PACIFIC OCEAN
ATLANTIC OCEAN
M E X I C O
GULF OF MEXICO
Bituminous Coal Fields actively mined
Anthracite Coal Fields actively mined
Iron Ore Deposits actively worked
Important Iron and Steel Centers
Wms. Eng. Co., N.Y.

Fig. 4. — Coal fields, iron ore deposits, and steel centers in the United States

Everglades of Florida or the forests of the Amazon.

The plants of the Coal Period were very different from those of the present; indeed, although some of the ferns resembled those of to-day, none of the many kinds of trees that we now know grew in those ancient forests.

After the plants had grown in the swamps for hundreds of years, sometimes to a depth of many feet, the plains sank beneath the grew again. After many more centuries the plains again sank, and the swamp vegetation was covered over as before. This rising and sinking of the land continued for ages, one set of layers of mud, sand, gravel, and vegetation being covered up by another, until many such sets were formed, producing many seams of coal separated by layers of rock. These are usually only two or three feet thick, but some are as much as ten or fifteen feet in thickness. Can you

explain why pieces of black rock, called *shale*, are often found in coal?

The distribution of these coal beds in the United States is shown in Fig. 4. What facts do you observe there? Judged from their extent, the swamps may possibly have covered as much as one tenth of the area of the continent.

When the plants died they fell into the water, making a woody matting which did not fully decay because the water prevented air from reaching it. If it could then have been dug up and dried, it would have made good fuel. Indeed, in Ireland, Norway, and other cool, moist lands, it is now possible to dig such woody matter out of the swamps and dry it for burning (Fig. 5). Such fuel, called *peat*, is much used for cooking and heating. Some of the poorer coals, known as *lignite*, are little more than peat beds partly changed to mineral coal.

The different kinds of coal

© *Underwood and Underwood*

Fig. 5. — Digging peat in Ireland

Other beds, having far more pressure upon them, have been changed to harder coal. One kind of coal, called *anthracite*, found in eastern Pennsylvania, has been so greatly changed that it is as hard as some rocks, and is known as *hard coal*. But most of the coal, like that of western Pennsylvania and the North Central States, although a real mineral and harder than lignite, is not so hard as anthracite. This is called *soft*, or *bituminous*, coal. The difference in hardness between anthracite and bituminous coal in Pennsylvania is due not to difference in age, but to a difference in pressure between various areas when the highlands were being formed.

The history of our mountain systems. — During the millions of years that the continent was slowly growing, mountain systems were forming in both the East and the West. These were caused by the shrinking and wrinkling of the earth's crust. They have had a great influence upon our climate, and therefore upon our crops, our animals, and ourselves.

Some facts in the history of the Appalachian Highland and the Western Cordillera

Most of the land in the Appalachian Highland (Fig. 1) was uplifted just after the Coal Period. Since then it has been slowly worn away by weathering and by running water, and thus lowered so that the mountains are now neither very high nor very rugged. Still, there are some peaks which rise more than a mile above sea level.

The western mountains, or *Western Cordillera*, are younger and therefore less worn down than those of the Appalachian Highland. For this reason they are much more rugged, with many deep canyons and lofty peaks, a few of which rise three miles and

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Fig. 6. — Mt. Shasta, a volcanic peak of California

Locate Mt. Shasta on the map (Fig. 1). What is its elevation above the sea? It rises from a base whose altitude is about 4,000 feet. What, therefore, is the actual height of the mountain? There are several small glaciers on its upper slopes. The lower mountain in the foreground is called Black Butte.

more above sea level. This, of course, includes the elevation of the broad plateau on which they rest, which itself is in many places more than a mile in height, or as high as the mountain peaks of the East. Some of these mountains are still growing, and now and then an earthquake is caused as the mountain rocks slip and move under the great strain.

How volcanic mountains were formed

While the mountains of the Appalachian Highland and the Western Cordillera have been caused by the wrinkling of the earth's crust, many of the mountain peaks in the West have been formed in a different way. They are conical in form and are built up of material that was forced to the surface from within the earth when they were active volcanoes. Mt. Lassen, in California, is now active; so are many in Alaska, Mexico, and Central America.

Great quantities of lava formerly flowed out of fissures or crevices in the rock and spread over the surface of the plateau about the bases of many of these mountains. Hundreds of thousands of square miles of the western part of the United States were thus covered with lava.

How the Mississippi Basin was formed. — From the mountain systems of the East and

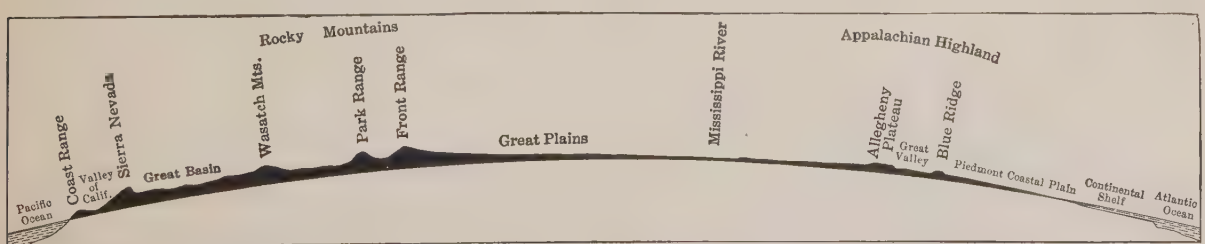


Fig. 7. — Diagram of a cross section of the United States at about the thirty-seventh parallel

West, the land slopes gently toward the Mississippi River (Fig. 7). These slopes form a trough, through the lowest part of which this river flows. It was mainly by the uplift of the mountains on its two sides that this broad trough was formed. Measure its width on the map of the United States (Fig. 17).

Like the mountains, this extensive region, called the *Plains of the Mississippi Basin*, has had a long history. At one time so much of it was under water that a sea extended from what is now the Gulf of Mexico all the way to the Arctic Ocean. In the rock layers that lie beneath the soil of the lowland are found many fossils of shells, coral, and fish that lived in this ancient sea. When these animals died, their harder remains were buried in the beds of sand, clay, and gravel that have since become rock.

After long ages most of this ancient sea bottom was raised to form dry land, although a part of it — from the Gulf of Mexico to the southern part of Illinois — remained under water for a long time afterward. Into this sea the Mississippi and other rivers discharged their floods and dropped their load of sediment, swept from the plains and distant mountains. As time went on, the river sediment partly filled up this sea and formed *deltas* and *flood plains* which, raised by a slight uplift, are among the most fertile lands of our country. And now the Mississippi River seems bent on filling up the Gulf of Mexico itself. Already it has built its delta far out into the Gulf, as you can see (Fig. 1).

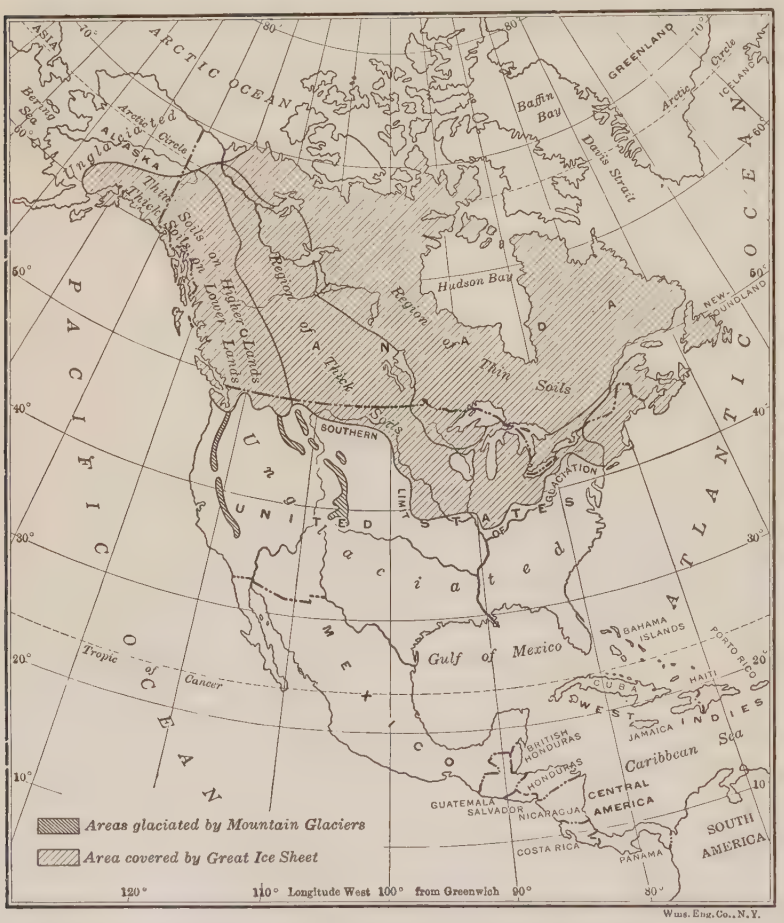


Fig. 8. — Glaciated and unglaciated portions of North America

Trace the southern border of the area covered by the Great Ice Sheet, known as the *glaciated* area. How much of North America was glaciated? What portion of the continent has thin soils? What portion has deep or thick soils within the glaciated area? In areas of thin soils, the Ice Sheet scraped away, or *eroded*, more than it deposited. In areas of thick soils, it deposited more than it eroded.

The Great Ice Sheet.—Long after the coal beds and the mountains were formed, there came another series of very important events on this continent. It became, at various periods separated from one another by long intervals of time, far colder than it now is, just as during the Coal Period it was much warmer. Indeed, it became

How vast sheets of ice, or glaciers, were formed

so cold that sheets of ice, or *glaciers*, were formed, so great that they covered most of the northern part of North America.

An ice sheet similar to those ancient ones may still be seen in Greenland (Fig. 1). Except along the very coast, the immense island of Greenland is now buried beneath a glacier which is as large as fifteen states the size of New York State.

The Greenland glacier is made of snow that has fallen in immense quantities on the high interior. You know that you can change a snowball into ice by pressing it in your hands. In a similar way, the pressure of the great mass of snow in Greenland has changed the lower layers into ice. As the snow collects and becomes ice, it spreads out, or *flows*, from the interior toward the coast. The great glaciers that grew up in North America no doubt were produced by snow and spread out in the same way.

The last of these, which we shall refer to as the *Great Ice Sheet*, covered most of the northeastern part of North America, reaching about as far south as New York City and the Ohio and Missouri rivers; but, as you can see from the map (Fig. 8), it did not reach very far south in the Northwest.

Extent of the Great Ice Sheet, and changes that it made

The Greenland glacier, moving toward the sea, drags away the soil, tears off fragments of the rock, and scours the rock layers as if it were a mighty sandpaper. The movement is very slow, yet the ice is always pushing onward to the sea, where enormous *icebergs* are constantly breaking off and floating away (p. 188). The Great Ice Sheet did the same things.

Being very thick and therefore very heavy, it swept away the soil that covered the land. Not only did it do this, but, with the help of rock fragments held fast in its bottom, it

Fig. 9. — Rock surface stripped of soil and smoothed by glacial ice

scraped off pieces of the solid rock and carried them forward with it. As it slowly moved over the surface, it also ground bowlders and pebbles together and rubbed them against the solid rock, scratching and grooving it (Fig. 9). Scratches thus made may still be seen pointing north and south.

The rock and soil that the glacier carried along were finally left in various places by the melting of the ice. Great heaps of clay and gravel, called *moraines*, were deposited along the outer margin wherever that remained stationary for a considerable period. Some of the moraine hills, or hummocks, are between one and two hundred feet high.

After standing for a while, and building a moraine in one place, the front of the glacier melted away toward the north; and each time that it halted it built up new moraines along its front. During the thousands of years that the Great Ice Sheet lasted, it carried millions of tons of clay and rock from one place to another, and built many low moraine hills, very irregular in shape.

The work of rasping, digging, carrying, and dumping which was done by the Ice Sheet has caused it to be likened to a combined file, plow, and dump cart of enormous size.

It was this Ice Sheet which caused the great number of lakes and ponds in the northeastern part of North America. Minnesota alone is said to have ten thousand, and in New England also there are many thousands (Figs. 32 and 77). Most of the states outside the region covered by the Ice Sheet have very few lakes.

Effects of the work of the Ice Sheet

1. Upon our lakes

The manner in which these lakes were formed is as follows. The load of clay and bowlders, or *drift*, was not dumped evenly over the land. Hollows and ridges were left, and after the ice melted, water filled the hollows, forming ponds and lakes. In other cases the drift partly filled valleys and thus built dams, behind which ponds and lakes collected.

Even our Great Lakes probably did not exist before the coming of the Ice Sheet. Their basins occupy broad river valleys which have been blocked by dams of drift and deepened by the plowing of the ice.

The Ice Sheet has also had an important influence upon our manufacturing. The deposit of drift in valleys often so filled them that, after the ice was gone, the streams were forced to seek new courses. These courses sometimes lay down steep slopes, or across buried ledges, over which the water now tumbles in many rapids and falls. Even the great cataract of Niagara (Fig. 27) was caused in this way, and the same is true of the falls and rapids of hilly New England (p. 34) and New York. The many lakes are reservoirs that help to maintain a constant flow of water. In this way certain regions, as we shall see, came to have the abundant water power which has helped to make them important manufacturing regions. In most sections of our country not reached by the ice, rapids and falls are much less common. Did the Ice Sheet cover the land on which you live? (See Fig. 8.)

2. Upon our manufacturing

A third important influence of the Ice Sheet was upon the soil, and therefore upon our farming. In many parts of the country the soil has been made by the decay or *weathering* of the rock; but in the areas which the ice covered, the weathered rock was swept away, and drift was left in its place. Here the soil was made by the grinding of rocks together, much as flour is made by grinding wheat; in fact, some glacial clay is called *rock flour*. In some places the layer of drift that the ice left is several hundred feet deep.

3. Upon our agriculture

On the other hand, in some places the ice failed to grind the rock into tiny bits, but left many pebbles, and even large bowlders, to cover the ground and hinder the farmer. In other places the great quantities of water supplied by the melting ice washed away much of the rock flour. This left extensive sand and gravel plains that are by no means fertile.

Formation of the coast line. — In studying the Mississippi Basin and the formation of coal, we saw that the sea bottom, and even the dry land, are not always the same. On the contrary, they may slowly rise or sink. Such changes in the level of the land are even now in progress in many places, though the process is so slow that many years, and even centuries, must pass before the changes become evident. For instance, much of the land along the eastern coast of the United States is probably sinking, while portions of our western coast are rising.

Recent movements of the land

Some of the recent changes in the level of the land have had an important effect. This is shown on our northeastern coast, where the

Effects of sinking of our northern coast

land has sunk several hundred feet. By this sinking, the ocean water has been allowed to enter the valleys, leaving the higher land to form peninsulas, capes, and islands, while the valleys have become harbors, bays, and straits (Fig. 1).

Many good harbors were made by this sinking of the land, the best being where rivers enter the sea. When the land was higher, the streams carved out broad valleys; but as the land sank, the sea entered, forming extensive bays. That is the way in which the Gulf of St. Lawrence was formed; also New York, Delaware, Chesapeake, and San Francisco bays, as well as many other excellent harbors on the east and west coasts. What rivers carved out the bays mentioned? (See Figs. 32 and 175.)

The rising of our southern coast

Bordering our eastern coast is a broad ocean bottom plain, called the *continental shelf*, where the water is comparatively shallow (Fig. 1). If the continental shelf were raised a few hundred feet, it would form a plain.

That part of the Southern States which borders the Gulf of Mexico and the Atlantic Ocean was once a part of this continental shelf, but has been elevated above sea level and now forms a low plain (Fig. 1). After this plain was raised, however, and after rivers had cut shallow valleys, the coast was slightly lowered; thus bays and sounds were formed. The Florida peninsula is also a sea bottom that has been slightly lifted above the ocean.

Present size, shape, and position of our continent. — After the many changes that have gone on during millions of years, owing to the rising and sinking of the land, North America is now third in size among the seven continents of the earth. Which are larger? Which are smaller? (See pp. 477 and 480). The continent has the form of a triangle, with the broadest portion in the north. Compare its shape with that of South America (Fig. 251); of Africa (Fig. 472).

The northern part is so wide that Alaska extends to within fifty miles of Asia. Labrador, however, the part of the continent that extends farthest east, is over 2,000 miles from Europe.

Importance of this position. — Most of the inhabitants of North America live far to the south of Alaska and Labrador, where the oceans are much broader. Thus the densely populated portion of the continent is a long distance from Europe on the east, and a still greater distance from Asia on the west. This wide separation from other continents has had a great influence upon the history of the people of North America. It helps to explain, for instance, why the Spanish colonies were able to win their independence from Spain, and the United States its independence from England; for the distance across the sea was too great for the mother countries to send large armies and the supplies necessary for their support.

Our distance from other continents helps also to explain the growth of our industries. At first the colonies imported even bricks, doors, and furniture from Europe. But it proved so troublesome and expensive to carry such goods so far that our settlers soon learned to produce most of the articles they needed for themselves. Thus we early began to manufacture.

Now that men have learned the use of steam, the distance from other countries is not so serious a drawback. Sailing vessels are very slow and always at the mercy of winds and storms. Steamships, on the other hand, are easily controlled, and may go as

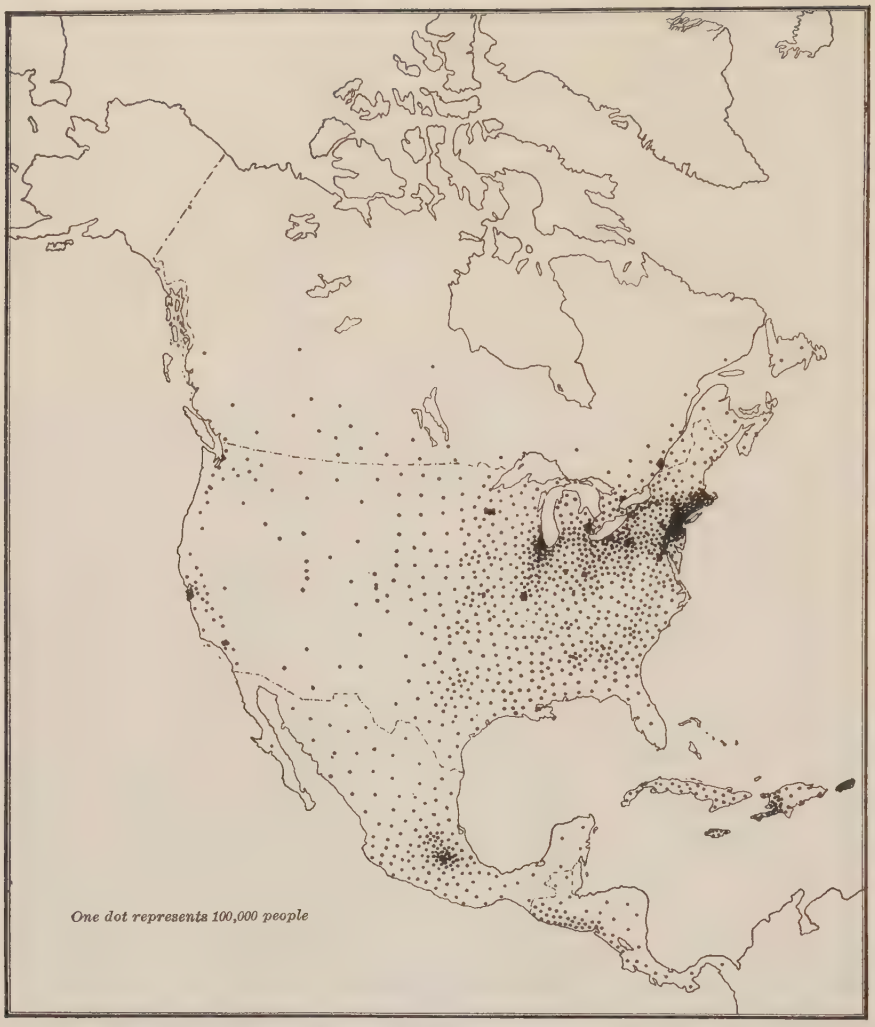


Fig. 10. — Distribution of population in North America

Each dot represents 100,000 people. It must not be thought that the entire hundred thousand are congregated at the place indicated by each dot, except in the case of cities. On the other hand, they are distributed more or less evenly over the area between the dots. Cities of 200,000 or more are represented by a group of dots in which the dots are very close together.

far in one day as the old-fashioned sailing vessels traveled in a week. With the use of steam, therefore, immigrants from Europe have found their way here by millions; and trade with Europe and other parts of the world has rapidly developed. Steam has made the ocean an excellent highway for reaching distant points. Thus our separation from other continents has helped in many ways to make us independent, without bringing serious disadvantages.

Facts to be especially well fixed. — 1. The way in which coal was formed. 2. The three kinds of coal, and the location of the principal beds. 3. The location of the Appalachian Highland and the Cordilleran Highland. 4. The effects of the Great Ice Sheet. 5. The effects of the sinking and rising of our coast line.

Problems for independent study. — 1. What signs would you look for, to tell whether or not the Ice Sheet had covered a certain section? Mill, H. R.: *International Geography*, pp. 724–725 (Appleton); Tarr, R. S.: *New Physical Geography*, pp. 137–156 (Macmillan). Are there any such signs in your neighborhood? 2. Make a collection of different kinds of coal, including peat. See what proof you can find that coal has been made from plants. Allen, N. B.: *Geographical and Industrial Studies: United States*, Chapter XI (Ginn); Carpenter, F. G.: *North America*, Chapter XXVIII (American Book); Trotter, S.: *The Geography of Commerce*, pp. 75–79 (Macmillan). 3. Hunt for fossils in your neighborhood. 4. Make a collection of specimens of different rocks to illustrate the kinds mentioned in the text. 5. Make a drawing showing the extent of the Great Ice Sheet, particularly the states that were covered wholly or partly by it. 6. The icebergs from the Greenland glacier are a source of great danger. What is the danger, and what precautions are

taken to escape it? National Geographic Magazine, 1920, vol. 37, pp. 293–322; Mill, H. R.: *International Geography*, pp. 1042–1043; Tarr, R. S.: *New Physical Geography*, pp. 194, 195.

How to make use of the headings in this book. — Each section of the text in this book is the answer to some question. You should keep this question in mind as you read. In that way you can easily discover the principal facts.

What the question is for each section is suggested by the sectional heading in black type. For example, on p. 7 is the heading **How the Mississippi Basin was formed.** The question thus suggested is "How was the Mississippi Basin formed?" The answer occupies three paragraphs. Then comes the topic (p. 8) **The Great Ice Sheet**, under which the first question suggested is, "How were vast sheets of ice formed?" and the second, "What was the extent of the Great Ice Sheet and what changes did it make?" As you begin a section you should note the question indicated in the heading; you should make sure that you have a fairly complete answer to it before proceeding to the next section.

II. Life upon the Continent

Political Unit or Group	Area in Square Miles	Population
United States	3,027,000	105,709,000
Alaska	590,900	55,000
Canada and Newfoundland	3,932,000	8,687,000
Greenland	827,300	13,000
Mexico	767,200	15,116,000
West Indies	91,800	9,974,000
Central America	219,500	5,516,000
North America	9,455,700	145,070,000

Questions. — Which one of the above countries or groups of countries is shown to be the most densely populated? Which is the most sparsely populated?

Distribution of inhabitants of North America. — As shown by the above table, there are now about 145,000,000 inhabitants in North America. Note how many of these live in the United States; Canada; Mexico; Central America. Fig. 10 shows how unevenly they are distributed. Since each dot represents 100,000 people, by counting the dots in any particular area you can learn how many people it contains. In some areas, however, the dots are crowded too closely together to be counted, while in other broad areas there are too few inhabitants to allow any dots at all. Point out some of the most densely populated areas, and some that have few or no inhabitants.

Why there are few inhabitants in the far North. — Why are the people so unevenly distributed? Fig. 12 suggests why there are few in the far North. North of a certain line that you see on the map, the average temperature even during the warmest summer month does not go above 50° Fahrenheit. That area is the region or belt that is *always cold*. The summer days are long, but the heat waves strike the earth at such a slant as to bring but little warmth. The surface thaws out to a depth of a few inches, but there is ice in the swamps at all seasons. The winters, of course, are very cold, the thermometer often going down to 50° and more below zero.

In such a region agriculture is almost out of the question. In fact, it is too cold even for trees, except possibly on some south-

UNITED STATES
POLITICAL MAP
Scale of statute miles
0 50 100 200 300 400
National capitals
State capitals
Navigable rivers in dark blue
Canals
Railroads
Trunk lines
Other lines
Important highways
Cities with over 1,000,000
New York
Cities with 200,000 to 1,000,000
St. Louis
Other cities
Richmond
WILLIAMS ENGRAVING CO., N.Y.
Longitude
West
PACIFIC OCEAN
GULF OF CALIFORNIA
LOWER CALIFORNIA
MEXICO
WASHINGTON
OREGON
IDAHO
NEVADA
CALIFORNIA
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
Seattle
Everett
Tacoma
Olympia
Spokane
Portland
Astoria
Salem
Boise
Pocatello
Butte
Helena
Billings
Bismarck
Regina
Winnipeg
Lake Manitoba
Devils Lake
Pierre
Cheyenne
Denver
Colorado Springs
Pueblo
Wichita
Oklahoma City
Fort Worth
Austin
San Antonio
Reno
Carson City
Salt Lake City
Ogden
Great Salt Lake
Sacramento
Berkeley
San Francisco
Oakland
Stockton
Fresno
Los Angeles
Santa Barbara
San Diego
Phoenix
Tucson
El Paso
Albuquerque
Santa Fe
Chihuahua
Monterey
Brownsville
Victoria
Mt. Rainier NATIONAL PARK
Mt. Adams
Mt. Hood
Mt. Jefferson
Mt. Scott
CRATER LAKE NATIONAL PARK
Mt. Pitt
Mt. Shasta
Lassen Peak
GLACIER NATIONAL PARK
YELLOWSTONE NATIONAL PARK
ROCKY MOUNTAIN NATIONAL PARK
YOSEMITE NATIONAL PARK
SEQUOIA NAT. PARK
Mt. Whitney
Death Valley
Tulare Lake
Salton Sea
MESA VERDE NAT. PARK
SANTA BARBARA ISLANDS
SAN BERNARDINO MTS.
San Francisco Mtn.
Pt. Conception
Columbia R.
Snake R.
Colorado R.
Rio Grande
Missouri R.
Yellowstone R.
Platte R.
Arkansas R.
Canadian R.
Red R.
Pecos R.
Gila R.
Humboldt R.
Sacramento R.
Green R.
Salmon R.
Clark Fork
Flathead Lake
Milk R.
Powder R.
Big Horn R.
Niobrara R.
James R.
White R.
Republican R.
Smoky Hill R.
Cimarron R.
Nueces R.
Longs Peak
Pikes Peak
Grand R.
Sevier L.
Utah L.
Fremont Peak
BLACK HILLS
Sourie
Lake Manitoba
Winnipe
Fort
Wichita
Austin
Brownsville
Monterey
Chihuahua
Cheyenne
North Platte R.
South Platte R.
Rio Grande
Rio Pecos
Rio Grande
Rio Grande
Rio Grande

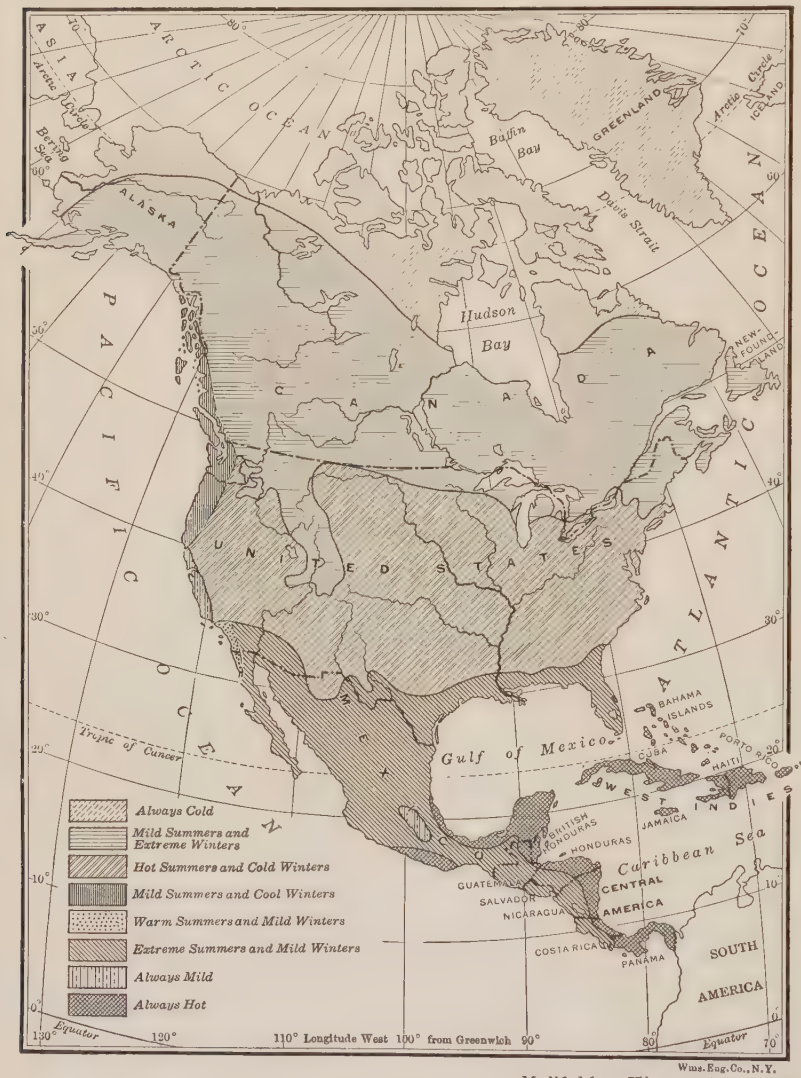
93°
89°
85°
81°
77°
73°
69°
45°
41°
37°
33°
29°
25°
Lake Winnipeg
Lake Nipigon
Lake of the Woods
Rainy Lake
ISLE ROYAL
Red Lake
L. Itasca
Duluth
LAKE SUPERIOR
Sault Ste. Marie
Georgian Bay
LAKE HURON
Green Bay
LAKE MICHIGAN
Minneapolis
St. Paul
Mississippi R.
WISCONSIN
Sioux Falls
Wisconsin R.
Madison
Milwaukee
Grand Rapids
Lansing
Port Huron
Flint
Lake St. Clair
Detroit
LAKE ERIE
Toronto
LAKE ONTARIO
Rochester
Utica
Syracuse
Niagara Falls
Buffalo
Ottawa R.
Montreal
St. Lawrence River
Quebec
Lake Champlain
Burlington
Montpelier
Mt. Washington
Portland
Bangor
Augusta
MAINE
N.H.
VT.
Concord
Manchester
Lowell
Lynn
Boston
Cape Cod
Providence
Worcester
Springfield
Hartford
New Haven
Bridgeport
LONG ISLAND
New York
Newark
Jersey City
Elizabeth
Trenton
NEW JERSEY
Camden
Wilmington
Philadelphia
Harrisburg
Reading
PENNSYLVANIA
Pittsburgh
Erie
Cleveland
Youngstown
Akron
Canton
Toledo
Fort Wayne
South Bend
Chicago
Rockford
Peoria
Des Moines
Sioux City
IOWA
ILLINOIS
INDIANA
Indianapolis
Springfield
Dayton
Columbus
Cincinnati
OHIO
Wheeling
WEST VIRGINIA
Baltimore
Washington
Annapolis
Dover
Delaware Bay
C. May
Lincoln
St. Joseph
Kansas City
Topeka
Jefferson City
St. Louis
East St. Louis
MISSOURI
Evansville
Louisville
KENTUCKY
Frankfort
Charleston
VIRGINIA
Richmond
C. Charles
C. Henry
Norfolk
Albemarle Sound
Cairo
Winston-Salem
Raleigh
NORTH CAROLINA
C. Hatteras
Knoxville
Nashville
Mt. Mitchell
Cape Fear R.
C. Lookout
Wilmington
TENNESSEE
Memphis
Chattanooga
Arkansas R.
Little Rock
ARKANSAS
SOUTH CAROLINA
Columbia
C. Fear
Atlanta
Birmingham
Charleston
Macon
Savannah
GEORGIA
MISSISSIPPI
ALABAMA
Montgomery
Jackson
Shreveport
Dallas
Red R.
LOUISIANA
Baton Rouge
Mobile
Pensacola
Tallahassee
Jacksonville
St. Johns R.
FLORIDA
Apalachee Bay
New Orleans
Houston
Galveston
Mississippi Delta
Tampa
Tampa Bay
Lake Okeechobee
The Everglades
C. Canaveral
BAHAMA ISLANDS
(British)
Florida Strait
Key West
C. Sable
GULF OF MEXICO
ATLANTIC OCEAN
from Greenwich

Fig. 11

facing slopes. Even these are more like vines than trees, sometimes rising only a few inches above the ground.

Since there is so little vegetation, few large land animals can thrive. The caribou, moose, fox, and polar bear are the principal four-footed beasts; but birds are more numerous. Many more animals have their homes in the sea than upon the land, because there, except at the very surface, the temperature never goes below the freezing point. Therefore there are plenty of sea animals of all sizes, from those so small that they cannot be seen without a microscope, to the whale, the largest of all animals.

On account of the unfavorable conditions for agriculture, man can do little in all this region except hunt and fish. Human habitations are here chiefly along the coast. Where hunting and fishing are the principal occupations, there can be few inhabitants. Can you see why? It is probable, therefore, that the belt marked *always cold* will never be thickly populated.



Modified from Köppen and Jefferson

Fig. 12. — Temperature regions of North America

Why the population is so small in western North America.—South of this region are several belts that are warmer, the farther south they lie. The first is that described on the map as the region of *mild summers and extreme winters*. Trace its boundaries. Next comes the belt of *hot summers and cold winters*, after which is the belt of *extreme summers and mild winters;* and, still farther south, an area marked *always hot*. Note what portion of the continent is included in each of these.

Influence of temperature on the population

Bordering the Pacific are regions in which the temperatures are moderated by the winds that blow in from the ocean. The northern part of this coast and a narrow belt inland from it is a region of *mild summers and cool winters*. What tem-

perature region is east of this? Farther south is a region that is *always mild*, and still farther south is a region of *warm summers and mild winters*. What temperature belts are directly east of these, beyond the limits of the ocean's influence?

Only the northern half of the first of these belts, which includes a large part of Canada, is too cold for agriculture. What does Fig. 10 tell you about its population? Yet a low temperature is not the only reason for a thin population, for the same figure shows a very scant population in most of western North America from Canada southward across the United States far into Mexico. What are the reasons for this?

Fig. 13 suggests the answer. It shows that over most of this region the rainfall is slight. How many inches do you find? For an explanation of this light rainfall see p. 131. Where the fall is less than twenty inches the ordinary kind of agriculture cannot be carried on. Point out the areas that have less than that amount. Some sections have less than ten inches, and are deserts or semi-deserts. Locate them.

Influence of rainfall on the population
1. The general rule

After Gannett and Office of Farm Management, U. S. Dept. of Agric.

Fig. 13. — Annual rainfall in North America

Regions that have a rainfall of twenty inches or more may be considered as humid; from ten to twenty inches, semi-arid; less than ten inches, arid. What meridian marks approximately the western border of the humid portion of North America? About how much of the United States is humid? How much arid and semi-arid? Answer the same questions for Canada.

Where there is so little rain, vegetation is almost as scant as in the belt where it is *always cold*. The sagebrush is the most common plant, being found throughout most of this arid area. Others are the century plant and the cactus. Some of them have no leaves, so that they expose little surface to the air, and thereby suffer little from evaporation. Some have such large roots that the part underground is greater than that above.

After Schimper, modified and simplified

Fig. 14. — The plant regions of North America

1. In what portion of the continent is the cold treeless region? In what temperature region is this portion of the continent? 2. What country has the largest area of evergreen, or *coniferous*, forests? 3. Why are there coniferous forests in the Appalachian and the Cordilleran Highlands similar to those of Canada? 4. In what part of the United States are there broad leaved trees? What is the rainfall in this area? 5. Where are the grasslands of the continent? What is the rainfall in the eastern part of this region? In the western? 6. What is the rainfall in the semi-desert and scrub vegetation region? Small areas of this large region are true desert. Is this region as useless for agriculture as the cold treeless region? Only a few of the irrigated areas are shown here. For a more complete irrigation map see Fig. 156.

7. Show the relation of rainfall to types of plants along the fortieth parallel in the United States from east to west. 8. Why should the east and northeast portions of Cuba, Haiti, and Central America have tropical forests while the south slopes have scrub? See Fig. 13. 9. Why is Yucatan a grassland? See Fig. 13.

The locations of the boundaries of this map are to be considered only as approximate. No sharp line can be drawn between types of vegetation.

Possibly you know other ways in which such plants adapt themselves to a dry climate.

Most of these plants are of very little use to man; but there is a grass in many districts that is especially valuable for grazing.

The many mountains in this region also make much of the surface too rough for agriculture, even if there were sufficient rainfall. Name the principal mountain systems, and show their extent (Fig. 1). In one way, however, these mountains are helpful. They receive more rain than the lower lands about them, and thus permit more abundant vegetation and animal life.

For a long time the arid region was like the cold region in being of little use to man. **2. Some exceptions to it** It was valuable mainly for hunting and grazing, and could therefore support few inhabitants. If you compare Fig. 10 with Fig. 13, you will see that the more densely populated areas are in general those that have the heavier rains. Yet, if you examine the map closely, you will discover that this rule does not always apply. There are many important exceptions in this portion of the continent. For example,

a small section of southern California is densely populated. Although the climate of this region is very dry, its population has in recent years been rapidly increasing. You will learn the explanation of this later in your study of the Western States (p. 140).

Some of the reasons for the great population in the eastern portion of the continent. — The more densely populated areas shown on Fig. 10 are usually regions that have three important advantages: their temperature, particularly during the summer, is high enough, their rainfall is heavy enough, and the surface of the land is level enough, for profitable agriculture. Agriculture is the greatest occupation in the world; more persons are engaged in it than in any other; and all the others are greatly dependent upon it.

The larger areas of adequate rainfall, moderate temperatures, and level land

Note the temperatures of the more densely populated portions of the continent. In which of the belts just mentioned do these densely settled areas lie? What do you discover about their rainfall and surface features? Do they have the three advantages just named?

No doubt you quickly find some exceptions. For example, a part of Mexico that is thickly populated has only a light rainfall. Also, the state of Pennsylvania, whose population is nearly equal to that of all our Western States together, is somewhat mountainous. What has brought so many people to these localities in spite of such disadvantages you will learn in your later study of geography.

On the other hand, some of the regions that meet these three conditions admirably have very thin populations. They may be too hot and unhealthful, or too swampy, or not fertile enough, for agriculture. Can you find any such regions?

It is evident that climate and surface features have exerted a great influence upon the density of population of the different parts of our continent. They have prevented large sections from becoming populated; have kept the population scant in other sections; and in still others have greatly favored settlement.

The great variety of factors determining density of population

It is true also that there are many other factors that influence density of population besides these two. For example, much depends upon the advantages of a given area for trade with other areas; upon its mineral deposits; and upon the ease with which materials can be transported from one place to another.

How a great many factors have worked together — some helping and others hindering — to determine the population in each part of the continent, makes up a large part of the study of geography.

Facts to be especially well fixed. — 1. The most densely and the most sparsely populated sections of North America, with the explanation of each. 2. The effect of the Western Cordillera upon the rainfall of the western half of the United States.

Problems for independent study. — 1. How are some of the animals in the far North protected from being discovered by their enemies or by their prey, through their coloring? Shepheard-Walwyn, H. W.: *Nature's Riddles*, Chapter III, especially p. 49 (Cassell); Tarr, R. S.: *New Physical Geography*, pp. 355–356 (Macmillan). 2. There is a possibility that one industry besides hunting and fishing will flourish extensively in the far North. What is it? Higginson, E.: *Alaska*, pp. 253–255, 453 (Macmillan). What reasons can you give for expecting its development? 3. Name the principal kinds of coniferous and broad leaved trees of North America (see Fig. 14). Also, collect pictures, or

make drawings or paintings, of them. Rogers, J. E.: *Trees that Every Child Should Know* (Doubleday Page). 4. What, do you imagine, would be the effect upon the density of population about New York City if the temperature there became as cold as in northern Canada? If it became as hot as in southern Mexico? 5. Would North America have a larger or a smaller population if the broader part of the triangle were in the south instead of in the north?

A class or school library that would be especially valuable for geography. — It would make your work in geography much more interesting if you would start a class or school library for that subject. There are some magazines and other publications which you ought to have at hand for use when you have spare time, or for which you might sign up, as you would in a public library, and take home with you to read. You ought first to take a good daily newspaper. Among the good magazines for which you might subscribe are the following:

National Geographic Magazine, Washington, D. C.

The World's Work, Garden City, N. Y.

St. Nicholas, The Century Company, New York City.

The Literary Digest, Funk & Wagnalls Company, New York City.

Youth's Companion, Perry Mason Company, Boston, Mass.

Current History, New York Times Company, New York City.

Among especially valuable reference works are the following:

The World Almanac and Encyclopedia (The Press Publishing Company, New York City). This is one volume; since a new book is issued every year, the information and tables of figures are kept up to date.

The Statesman's Year-Book (The Macmillan Company, New York City).

The World Book (The World Book, Inc., 2126 Prairie Ave., Chicago), an encyclopedia in eight volumes for young people.

The Book of Knowledge (The Grolier Society, 2 W. 45th St., New York City), an encyclopedia in twenty volumes for young people.

Your class can also purchase some publications by the government, while many may be obtained without charge by writing to your congressman or senator. If you write to the Superintendent of Public Documents, Washington, D. C., you can secure a list of those issued.

III. Principal Peoples of North America

The Indians. — The early white settlers of North America were greatly deceived regarding the numbers of Indians in the regions that they visited. Although the Indians were very thinly scattered over large areas, their natural routes of travel were the same as those of the white man, — the waterways. These were selected as sites for their villages, for they furnished drinking water and fish and permitted easy travel by canoe for hunting or war or barter. Nearly all the early missions, forts, and trading posts were thus located. Many explorers knew nothing of the country lying back of the rivers and rashly concluded that Indian villages were as numerous there as along the streams.

Their number and distribution

We now know that people who depend for their living mainly upon hunting and fishing need a large area from which to get their food. In the eastern half of the United States, it is probable that an Indian village of 100 persons required at least 100 square miles of hunting and fishing grounds and possibly even 200 or 300. Where corn, beans, yams, and other vegetables were raised, less land would be required. If each Indian required two square miles of land to supply him with food and clothing, how many Indians might there be in the eastern half of the United States?

There were probably not more than 1,000,000 Indians in North America north of the Rio Grande River at the time when

Columbus discovered America. At the present time there are about 340,000 in the United States and 120,000 in Canada. There have always, however, been far greater numbers in Mexico and Central America.

Some of the early tribes were true savages; others, not so savage, may be classed as barbarians. The barbarians raised Indian corn, pumpkins, and tobacco; they baked pottery; used tools and weapons made of stone; and lived in villages.

The character of their civilization

Indians that were more nearly civilized lived in the southwestern part of what is now the United States, in Mexico, and in Central America. Though much of this region is arid, the Indians raised crops by irrigation and built houses of stone and sun-dried brick. These tribes lived in villages or *pueblos*, as do many of the more advanced peoples in arid sections.

The most noted among the Indians of Mexico were the *Aztecs*, who lived in and near the region where the City of Mexico now stands. They had a much better government than other North American tribes; they mined gold and silver and made various articles out of these metals; they wove blankets, and ornamented their pottery and their buildings in an artistic manner.

All these Indians, for the most part, lived the quiet life of the farmer. They preferred peace to war, and a settled home to the nomadic life of the hunter.

Although some tribes thus approached civilization, the Indians, as a race, never became a powerful people. There are several reasons for this.

Why they never became more powerful

One is that instead of forming a union and living at peace with one another, they were divided into many independent tribes. Each tribe had a certain area over which it could roam and hunt; if it went beyond this, war might follow. War very often did follow. Thus they were constantly weakened by fighting.

1. The frequency of war

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Fig. 15. — A portion of a Pueblo Indian village on a mesa

In New Mexico and Arizona Indians known as *Pueblo* Indians (Spanish for "village") live in villages the houses of which are made of stone and *adobe* or dried mud. Their cultivated fields, many of which are irrigated, are on the more level land below.

The level nature of a large part of the country greatly increased this danger of war, and prevented any one tribe from advancing in civilization much beyond its neighbors. Had the surface of North America been very mountainous, there might have been some places where a tribe would have been protected by surrounding mountain walls. Then these Indians might have devoted

themselves to other work than war; and they might even have collected wealth and developed important industries.

But the vast plains of the Mississippi Basin and the extensive plains and low mountains of the East afforded little protection. If any one tribe had built good homes and collected treasures within them, the neighboring Indians would surely have attacked them. The Aztecs were constantly in danger from this source. The fact, however, that they were partly protected by mountains and deserts was one of the reasons why they became more civilized than the Indians of the Northeast.

2. The lack of domestic animals

The fact that the Indians had no domestic animals for use in agriculture was another reason why they did not make more progress. The horse, cow, ass, sheep, goat, and hog are of great service in supplying food and materials for clothing or for helping in agriculture. Without them farm work becomes severe drudgery, because it is then necessary to do everything by hand. Since the Indians had few of these animals to help them, they could do but little farming. Since they made so little use of the land and were therefore widely scattered, it became easy for the white man to take possession of the territory which they had occupied. The white man felt that he was justified in doing this because he could make better use of the soil, the forests, and the minerals. Do you think he was right?

Instead of roaming about, as many formerly did, the Indians are now limited to certain territory assigned to them by our government, or have become American citizens and live as other citizens do.

The Spaniards. — There was great excitement in Europe when it was proved that there were vast territories on this side of the Atlantic held by uncivilized people. America was pictured as containing all sorts of treasures, and European nations vied with one another in fitting out expeditions to take possession of them.

Spain naturally led, for in the sixteenth century it was one of the most powerful nations of Europe; and it was the Spaniards who had sent Columbus on his voyage of discovery. The section reached by the Spaniards had a climate enough like their own to make them feel at home there. Soon they came into possession of most of South America, Central America, Mexico, and the southwestern part of what is now the United States. They had one advantage over the English and French, who settled farther north: the portion of the continent which they explored is so narrow that they easily crossed it. Thus they were able to settle both the Atlantic and the Pacific coasts. It was largely because of this fact that they took possession of the western coast as far north as San Francisco.

The portion of the continent taken by them

Why did they not hold this territory? Partly because they came here to get rich and return home, rather than to make permanent homes for themselves. With that object, they robbed the natives of all the gold and silver they could find and carried it back to Spain. In addition, they cruelly mistreated the people, compelling them to work as slaves and killing them for the slightest cause. Largely for these reasons, their control over this territory did not grow stronger as the years passed; and at the first opportunity the natives threw off their rule. The Spanish now hold no territory in the New World. The chief reminder of their former power

Why they did not keep this territory

is the Spanish language, which is spoken in most of the countries of the New World south of the United States.

The French. — The French began their settlements in a very different quarter, being early attracted to our coast by the excellent fishing on the Newfoundland Banks (p. 188). Soon the fur trade with the Indians proved profitable, and the French took possession of Nova Scotia and the region along the St. Lawrence River and the Great Lakes.

Location of their settlements

The value of the fur trade, together with a desire to convert the Indians to Christianity, led them as far as the headwaters of the Mississippi River. Making their way southward to the mouth of that river, they took possession of a large part of the Mississippi Valley, calling it Louisiana in honor of their king, Louis XIV. Trace on the map (Fig. 17) the route they probably took in their canoes from Quebec to the mouth of the Mississippi River, and estimate the distance.

In order to hold this vast territory, they established a chain of trading posts and forts from the Gulf of St. Lawrence to the Gulf of Mexico. One of the most important of these forts was built where Pittsburgh now stands. Many places in the St. Lawrence and Mississippi valleys still have French names; for example, Lake Champlain, Marquette in Michigan, La Salle in Illinois, St. Louis, and New Orleans. Can you name others?

The climate of the French territory was, on the whole, more favorable than that of the Spanish country; for, though rather severe in the St. Lawrence Valley, it was neither hot enough to make people lazy, nor so cold as to discourage them. One of the greatest difficulties was that the few scattered settlers were unable to protect all the vast territory to which the French laid claim.

Some reasons why they lost this territory

The English. — The Spanish and French left only a narrow strip along the Atlantic coast for other nations. Among those who made settlements there were the Dutch in New York and the Swedes in Delaware; but the English soon captured New York City (then called New Amsterdam) from the Dutch, and extended their settlements along most of the coast from Florida to Nova Scotia.

Location of their earlier settlements

In several respects the portion that fell to the English seemed no more desirable than that held by the Spanish and French. Yet English-speaking peoples have managed not only to hold this, but also to add to it many of the possessions of the other two. At the present time the control of the entire continent, except Mexico, Central America, and a few small islands, is in the hands of either the United States or Great Britain. There is to-day a greater mixture of peoples in North America than in any other continent. In the United States alone there are thousands of emigrants from every nation of Europe and from the leading countries of Asia. English-speaking people have so ruled our country as to make it a place of refuge for all who are willing to work and desire a comfortable living.

Territory occupied by English-speaking people

There are, of course, several explanations of this remarkable result. Differences in the characters of these three races, no doubt, partly account for it. Yet there are other causes also, as is shown in the following paragraphs.

Reasons for its increase

The English emigrated to North America in greater numbers than the French or Spanish, for England was the most densely

populated of these three European countries. Not only were they thus the most numerous, but their new homes were in many respects the most favorably located; for the temperate climate of the central portion of North America is one of the best in the world for the production of energetic people. The warm summers allowed abundant harvests, while the long, cold winters forced the settlers to work hard in order to store up supplies for the cold season; yet, although they had to work a great deal, they still had energy left to use their leisure to good advantage.

Again, the fact that the English were hemmed in by forest-covered mountains on the west, and by the French and Spanish on the north and south, also proved an advantage. On that account, they were kept close together; and when wars arose, they were better able to mass their forces.

Facts to be especially well fixed. — 1. Reasons why the Indians never became more powerful in North America. 2. The chief European nations who sent settlers to America, their modes of life, and their success as colonists.

Problems for independent study. — 1. The three leading purposes in the settlement of the continent were to till the soil, hunt for gold, and trade in furs. Which of these, in the long run, was the most profitable? Why? 2. Find out what sections of North America are now occupied by other than English-speaking people. See under "United States population" in *The World Almanac;* National Geographic Magazine, 1914, vol. 26, pp. 265–271; *The Statesman's Year-Book* (Macmillan). 3. Debate this question: *Resolved,* that the treatment of the Indians by the United States Government has been wise. National Geographic Magazine, 1915, vol. 27, pp. 72–87; Outlook, vol. 109, p. 747; vol. 116, p. 136. 4. In two prominent cities in the former French territory the French language is still extensively spoken. What are they, and why has that language survived better there than elsewhere? Hotchkiss, C. W.: *Representative Cities of the United States,* pp. 66–68 (Houghton Mifflin); Carpenter, F. G.: *North America,* pp. 140–141, 325–327 (American Book); Johnson, C.: *Highways and Byways of the Mississippi Valley,* pp. 6–17 (Macmillan).

How to use an encyclopedia. — Look carefully at the backs of the volumes of any encyclopedia. You will see that the books are arranged alphabetically, and that each volume contains all subjects beginning with certain letters indicated on its back. For example, one volume may contain all subjects beginning with any letters from *A* to *Blight.* In using the encyclopedia called *The World Book,* to find more facts about Seattle, you turn to the volume having on the back the words *Richard to Tides.* Since the word *Seattle* begins with *S,* which stands in the alphabet between *R* and *T,* it will be found in this volume.

Most encyclopedias have headings of some sort that, like the headings in this geography, suggest what is contained in the paragraphs that follow. In case there are none, it is a good plan to glance at the topic sentence of each paragraph, which is usually the first sentence of that paragraph, to find what it deals with.

IV. The United States

Location and area. — On Fig. 2 we see that the United States occupies the central part of North America, extending from ocean to ocean.

Aside from Alaska, which belongs to us, the only countries on our north are Canada, Newfoundland, and Greenland. On our south are Mexico and the several small countries of Central America and the West Indies. Trace our boundaries on the north and south. What boundaries are natural? What are artificial?

The area of the United States is about 3,000,000 square miles, which is about four times the area of Mexico. Yet ours is not the largest country on the continent, for

the area of Canada is greater than that of the United States and Alaska combined.

Population. — Our population in 1920 was 105,709,000. The present population of Canada is over 8,000,000, of Mexico about 15,000,000, and of Central America and the West Indies about 15,000,000. Not only have we more inhabitants than the other countries of North America combined, but we have more than all the other countries of North and South America put together. Ours has plainly been the favorite country for settlers in the New World.

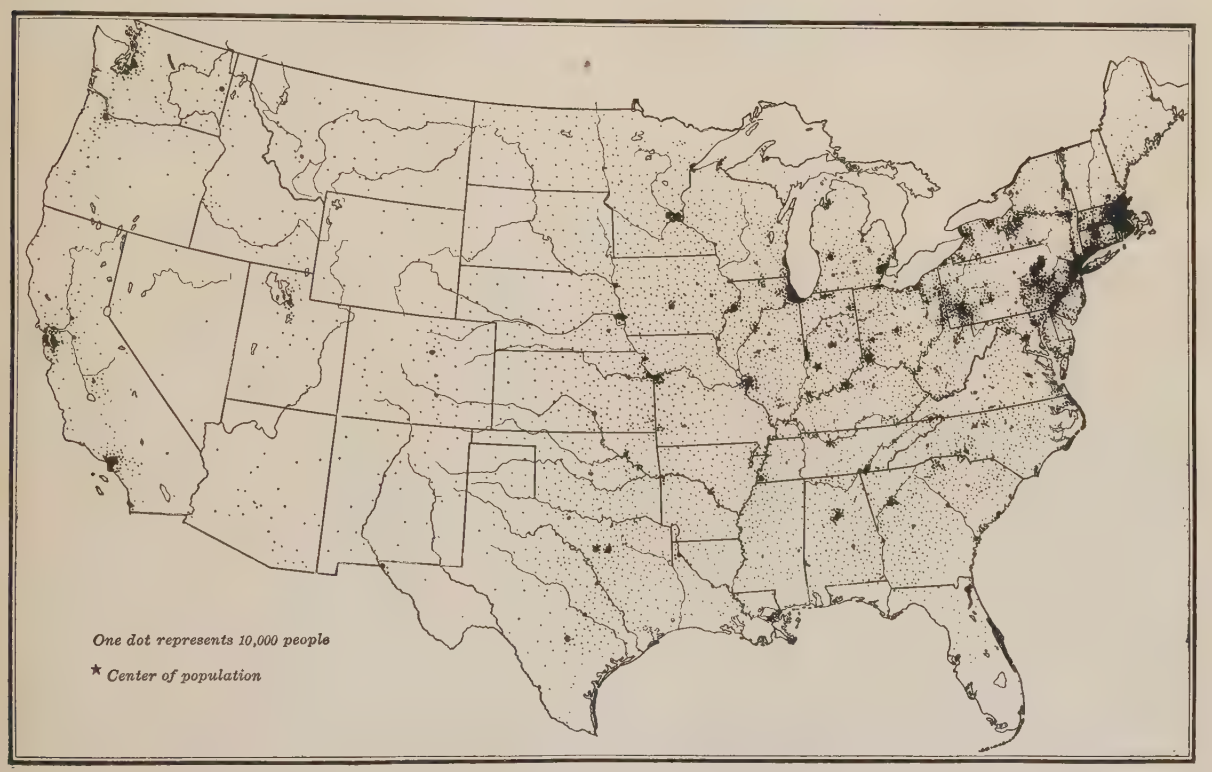

Fig. 16. — Distribution of population in the United States

Each dot on this map and the population maps of the sections of our country represents 10,000 people. As in the case of Fig. 10, where each dot represents ten times as many people as in the case of this map, it must be remembered that the people are distributed more or less evenly over the areas between the dots, except in the cases of cities. Cities of 20,000 or more are represented by two or more dots in a group.

Reason for studying the United States in sections. — It is therefore evident that the United States is the most important country in the Western Hemisphere; in fact, it is in many ways the leading country in the world. Our country is so large that it is necessary to divide it into sections in order to study it in proper detail. Accordingly, the states have been divided into four groups or sections. The first of these is the Northeastern States, commonly spoken of as "the East." The six of these eleven states that lie to the east of New York are sometimes referred to as "New England." The other groups, in their order, are the North Central States, or "the Middle West"; the Southern States, or "the South"; and the Western States, or "the West." Not only are the states within each group closely related in location, but most of them are similar to one another in surface features, climate, and

UNITED STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300 400
National capitals ★ ⊙ State capitals
Railroads ..... Divides and watersheds
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Below sea level
Cities with over 1,000,000 New York
Cities with 200,000 to 1,000,000 St.Louis
Other cities Richmond
Monterey
WILLIAMS ENGRAVING CO.,N.Y.
Longitude West
121° 117° 113° 109° 105° 101°
45° 41° 37° 33° 29° 25°
PACIFIC OCEAN
GULF OF CALIFORNIA
MEXICO
CANADA
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
GREAT BASIN
UTAH
ARIZONA
COLORADO PLATEAUS
MONTANA
WYOMING
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
ROCKY MOUNTAINS
SIERRA NEVADA
CASCADE RANGE
COAST RANGES
Mt. Baker 10,750 ft.
Mt. Rainier 14,408 ft.
Mt. St. Helens 9,697 ft.
Mt. Adams 12,326 ft.
Mt. Hood 11,225 ft.
Mt. Jefferson 10,522 ft.
Mt. Scott 8916 ft.
Mt. Pitt 9495 ft.
Mt. Shasta 14,380 ft.
Lassen Peak 10,577 ft.
Mt. Whitney 14,501 ft.
Death Valley
Fremont Peak 13,790 ft.
Longs Peak 14,255 ft.
Pikes Peak 14,110 ft.
San Francisco Mtn. 12,611 ft.
Vancouver
Victoria
Seattle
Tacoma
Olympia
Portland
Spokane
Astoria
Salem
Eugene
Boise
Pocatello
Helena
Butte
Billings
Bismarck
Pierre
Regina
Winnipeg
Lake Manitoba
Devils L.
Missouri R.
Yellowstone R.
Powder R.
Big Horn R.
Platte R.
Cheyenne
Denver
Colorado Springs
Salt Lake City
Ogden
Great Salt Lake
Utah L.
Carson City
Lake Tahoe
Reno
Sacramento
San Francisco
Berkeley
Oakland
Los Angeles
Long Beach
San Diego
Santa Barbara
Islands
Phoenix
Santa Fe
Rio Grande
El Paso
Fort Worth
Austin
San Antonio
Oklahoma City
Chihuahua
Guaymas
Monterey
Brownsville
Yellowstone Lake
Jackson Hole
Grand Canyon National Monument
Mesa Verde Nat. Park
Yosemite National Park
Sequoia Nat. Park
Rocky Mountain National Park
Yellowstone National Park
Crater Lake National Park
Uinta Mts.
Black Hills
Columbia R.
Snake R.
Colorado R.
Missouri R.
Mississippi R.
Gila R.
Green R.
Grand R.
Arkansas R.
Red R.
Pecos R.
Nueces R.
Continental Divide
Great Salt Lake Desert
Salton Sea
Pt. Conception
Mendocino C.
C. Blanco
C. Flattery

Fig. 17

93°
89°
85°
81°
77°
73°
69°
45°
41°
37°
33°
29°
25°
Lake Nipigon
Rainy Lake
Red Lake
Itasca
Duluth
Sault Ste. Marie
ISLE ROYAL
SUPERIOR
LAKE
MANITOULIN ISLAND
Georgian Bay
Green Bay
MICHIGAN
HURON
MINNESOTA
St. Paul
Minneapolis
Mississippi R.
WISCONSIN
Wisconsin R.
Milwaukee
Madison
Racine
Rockford
Grand Rapids
Saginaw
Port Huron
Flint
Lansing
Lake St. Clair
Detroit
LAKE ERIE
Toronto
Niagara Falls
Buffalo
Rochester
Syracuse
Utica
Schenectady
Albany
Troy
Ottawa R.
Montreal
St. Lawrence R.
Quebec
St. John R.
Lake Champlain
ADIRONDACK MTS.
Lake George
Hudson R.
CATSKILL MTS.
GREEN MTS.
WHITE MTS.
VT.
Montpelier
N.H.
Concord
Portland
Bangor
Augusta
MAINE
Manchester
Boston
Massachusetts Bay
Cape Cod
MASS.
Springfield
Worcester
Providence
R.I.
CONN.
Hartford
New Haven
Bridgeport
LONG ISLAND
New York
Newark
Jersey City
Erie
Cleveland
Youngstown
Akron
Canton
Toledo
South Bend
Gary
Fort Wayne
Chicago
Sioux City
IOWA
Davenport
Des Moines
Omaha
Rockford
Peoria
ILLINOIS
Springfield
St. Joseph
Kansas City
Jefferson City
St. Louis
E. St. Louis
INDIANA
Indianapolis
Terre Haute
Covington
Cincinnati
Springfield
Dayton
Columbus
OHIO
Wheeling
Johnstown
Pittsburgh
Altoona
Harrisburg
Trenton
Philadelphia
Baltimore
Dover
Annapolis
Washington
D.C.
Atlantic City
C. May
Delaware Bay
Chesapeake Bay
James R.
Richmond
Norfolk
Portsmouth
C. Charles
C. Henry
Albemarle Sound
Roanoke R.
Roanoke
Raleigh
C. Hatteras
Pamlico Sound
C. Lookout
C. Fear
Cape Fear R.
Charleston
Savannah
Jacksonville
Columbia
Atlanta
Augusta
Macon
Birmingham
Montgomery
Mobile
Pensacola
Tallahassee
Apalachee Bay
St. Johns R.
Suwanee R.
Okefenokee Swamp
Charlottesville
Shenandoah R.
Blue Ridge
Alleghany Mts.
Allegheny Plateau
Cumberland Plateau
Cumberland R.
Cumberland Gap
Knoxville
Nashville
Mt. Mitchell 6711 ft.
Chattanooga
Memphis
Tennessee R.
Tennessee
Kentucky
Louisville
Evansville
Frankfort
Huntington
Charleston
Ohio R.
WEST VIRGINIA
VIRGINIA
Roanoke
Wabash R.
Illinois R.
Missouri R.
Ozark Plateau
Arkansas R.
Tulsa
Kansas City
Cairo
Little Rock
ARKANSAS
Red R.
Ouachita R.
Mississippi R.
Yazoo R.
Tombigbee R.
Alabama R.
Chattahoochee R.
Pearl R.
Sabine R.
Trinity R.
Houston
Baton Rouge
New Orleans
Mississippi Delta
Galveston
LOUISIANA
MISSISSIPPI
Jackson
ALABAMA
GEORGIA
SOUTH CAROLINA
NORTH CAROLINA
Appalachian Plateau
Piedmont Plateau
Blue Ridge
Appalachian Mts.
Black Mts.
Mt. Mitchell 6711 ft.
Tampa
Tampa Bay
Lake Okeechobee
Everglades
FLORIDA
Florida Strait
Key West
BAHAMA ISLANDS
(British)
C. Sable
C. Canaveral
GULF OF MEXICO
ATLANTIC OCEAN
from Greenwich

Fig. 17

Questions on Fig. 17. — 1. Trace the divides or watersheds which separate the Mississippi Valley from regions to the west, north, and east. 2. In the tables of areas given in this book, the areas of states are combined land and water areas. Show how the area of the state of Utah would be affected if only land surface were considered. In the case of what other states would you expect the land area to differ greatly from the total area of land and water together? 3. There are two rivers on this map bearing the name "Colorado River." Locate them. 4. Why would it be impossible for any river on this map to rise in a green area, cross a brown area, and return to a green area? 5. Compare this map with Fig. 1 and point out on it the different highlands and lowlands there named. 6. If you wish to look up smaller places than are named on this map, refer to Fig. 499.

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the character and occupations of their inhabitants.

Importance of watching the scale of maps. — As you study each of these sections, a very important point to notice is the *scale* to which each map is drawn. Some of the maps in this book represent areas hundreds of times larger than those represented by even larger maps. Compare, for example, the area of New England in Fig. 2 with that of the same section in Fig. 32. In Fig. 2 an inch represents 675 miles. In Fig. 32 an inch represents seventy-five miles. According to that scale, how long is the state of Connecticut? How wide? Find what the scale is in Fig. 77. Using this scale, find the distance from Chicago to Buffalo. Using both maps, find the distance from Cleveland to Boston, by way of Albany. When studying a map, whether in this book, on the wall, on a globe, or in an atlas, it is always important first to observe its scale.

Office of Farm Management, U. S. Dept. of Agric.

Fig. 18. — Annual rainfall of the United States

What portions of the United States receive more than eighty inches of rainfall on the average each year? Name the states partly in the humid and partly in the semi-arid regions. What states have large arid regions?

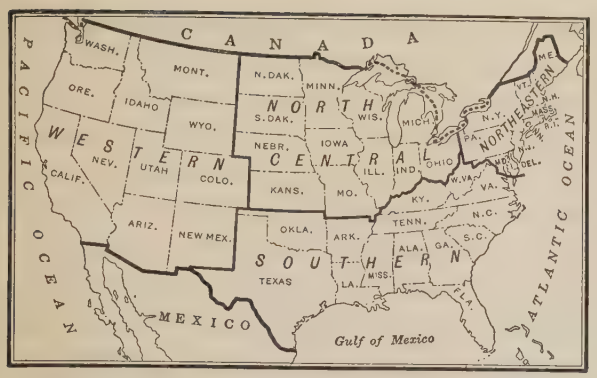

Fig. 19. — Division of the United States into sections employed in this book

Fig. 20. — Division of the United States into sections employed by the Bureau of the Census

The four grand divisions or sections of the United States outlined in the left-hand map are those used throughout this book both in maps and in text. This method of grouping the states helps us to study together states which are engaged in similar industries. Thus the Corn Belt (Fig. 70) lies almost entirely in the North Central States, which are divided into two sections in the right-hand map; and the Cotton Belt (Fig. 110) is included almost entirely in the Southern States, which in the right-hand map are divided into three sections. At rare intervals, however, when we wish to refer to smaller groups of states, it is convenient to use the more complicated system of division shown by the right-hand map.

1. The Northeastern States

State	Area in Square Miles	Population (1920)	Largest City	Population (1920)
Connecticut	5,000	1,381,000	New Haven	163,000
Delaware	2,400	223,000	Wilmington	110,000
District of Columbia	70	438,000	Washington	438,000
Maine	33,000	768,000	Portland	69,000
Maryland	12,300	1,450,000	Baltimore	734,000
Massachusetts	8,300	3,852,000	Boston	748,000
New Hampshire	9,300	443,000	Manchester	78,000
New Jersey	8,200	3,156,000	Newark	414,000
New York	49,200	10,385,000	New York	5,621,000
Pennsylvania	45,100	8,720,000	Philadelphia	1,823,000
Rhode Island	1,250	604,000	Providence	238,000
Vermont	9,600	352,000	Burlington	23,000

Questions. — 1. Which of the above states form the district commonly known as *New England* (p. 25)? 2. Compare the population of the largest *city* in the above list with the total population of the eight *states* in the list that have the smallest populations.

Density of population of these states. — Fig. 21 shows how dense the population of these states is. New York City, with its 5,600,000 inhabitants, is represented by 560 of these dots, which are here so close together that they overlap. West of it, across the Hudson River, are Newark, Jersey City, Hoboken, Elizabeth, Paterson, and other cities that together would require more than a hundred additional dots if these could be shown clearly so close together. Make a drawing of New York harbor and vicinity and show upon it the location of these places. There are many other large cities in these states. Point out the groups of dots that represent Philadelphia, Baltimore, Washington, Boston, Providence, Pittsburgh, Buffalo, Rochester. New York is the most

populous state in the Union and Pennsylvania is next. Note how small the area of this group of states is compared with that of our entire country; yet it contains more than one fourth of our entire population, and averages 172 persons to the square mile. Find the average per square mile for the United States by dividing the total population in millions by the total area in millions of square miles (p. 13).

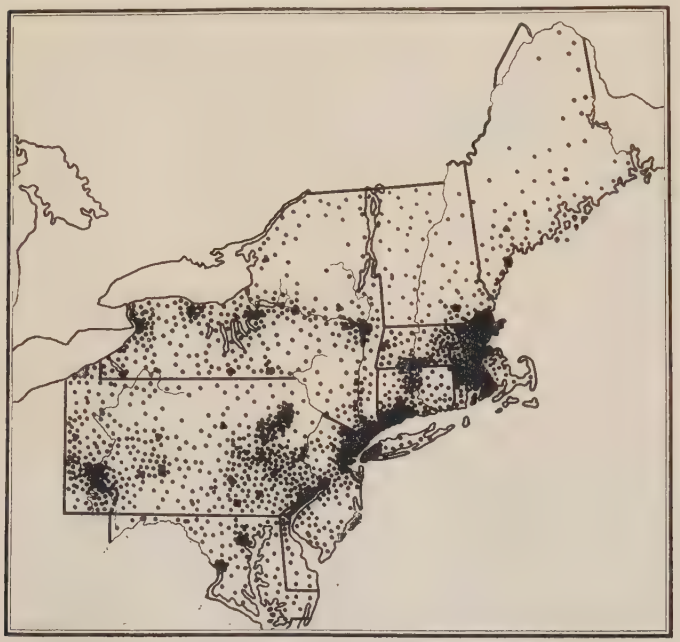

Fig. 21. — Distribution of population in the Northeastern States

Each dot represents 10,000 people.

Reasons for so many inhabitants. — One explanation of so dense a population is the advantages which these states enjoy for transportation. They are on the border of the busiest ocean in the world, with Europe and its population of 455,000,000 on the other shore. West of these states are the North Central and the Western States, extending all the way to the Pacific Ocean and containing very progressive inhabitants. They lie, therefore, directly between two of the busiest parts of the earth, the people on each side wanting countless things from the other side of the ocean in the way of food, raw materials for manufacture, and finished articles.

Advantages for transportation

1. Importance of the location of these states

The Northeastern States are aided in meeting this demand by the ease with which goods can be transported in both directions. Modern steamships can easily cross the Atlantic in a few days, and there are direct lines of communication with the Middle West.

2. Their ease of communication with the states farther west

a. The first easy route across the Appalachian Highland

There was a time when traffic with the West was greatly hindered by the Appalachian Highland. Judging from Fig. 32, how much of the surface seems hilly or mountainous? Note the pass across the Highland along the Mohawk River. At first wagon roads were put through the Highland; then it was decided that a canal could be dug connecting the Hudson River and Lake Erie. The easiest route lay along the Mohawk River between the Adirondack Mountains and the Catskills; the Erie Canal, following that course from the Hudson River to Buffalo, was completed in 1825. It gave New York the lead over other coast cities for trade with the West by way of the Great Lakes. Estimate the distance from New York to Duluth by this route (Fig. 17).

Then railroad building began, and New York City gained an additional advantage. The route followed by the Erie Canal required that trains climb only 500 feet to cross the highland, while the Allegheny Plateau in Penn-

b. The use of this route by the old Erie Canal and by railroads

sylvania compels them to climb 2,000 feet. Accordingly, railroads from the Hudson River to Lake Erie were among the first lines to be constructed. Others rapidly followed, one of the best known being the Pennsylvania Railroad, which was built from Philadelphia to Pittsburgh by holding to the valleys and occasionally tunneling through the ridges.

All the large coast cities now have extensive railroad connection with the Middle West. In Fig. 233 trace the main lines from several of them, and note what cities they pass through. Which route has the most large cities? Recently the Barge Canal has been dug between Troy and Buffalo, to take the place of the old Erie Canal and to accommodate much larger boats. Although the canal is not yet extensively used, it is likely to increase the advantage of New York to a considerable extent.

One thing more is necessary in order that these states may make full use of their other advantages for transportation. That is the large number of harbors so well inclosed that vessels anchored in them are safe from storms, so deep that the largest vessels can enter them, and so free from ice that they are open at all seasons. This need is admirably met in the great coast cities. We have already seen (p. 11) how nature has prepared the way. Man has completed what nature has so well begun by removing minor obstructions and by constructing wharves in each of the leading ports so that a large number of ships can dock at a time.

3. Excellence of their harbors

A second reason for so many inhabitants is the abundance of power for manufacturing, particularly of power supplied by coal. Coal is used for many other purposes than heating and cooking. It is valuable for making illuminating gas, for smelting iron, and for producing steam to run locomotives and the machinery of factories. It is this last use of coal that ranks it clearly as the most useful of all minerals and that has made possible the dense population in these states. If the coal supply were to fail, most of the factories would stop and a considerable part of the population would probably be compelled to go elsewhere to make a living.

Abundance of power for manufacturing

1. Coal-supply

a. Our dependence on coal

© *Ewing Galloway*

Fig. 22. — A portion of the harbor at Buffalo

Lake Erie is seen in the distance, as is also a portion of the harbor protected by a breakwater. In the foreground is a large ore boat that has just arrived from Lake Superior and is being unloaded. The huge machines that you see lift the ore from the hold of the boat through the openings in the deck called hatchways and dump it into the railway cars shown on the right. These cars will take the ore away to the numerous blast furnaces in this region.

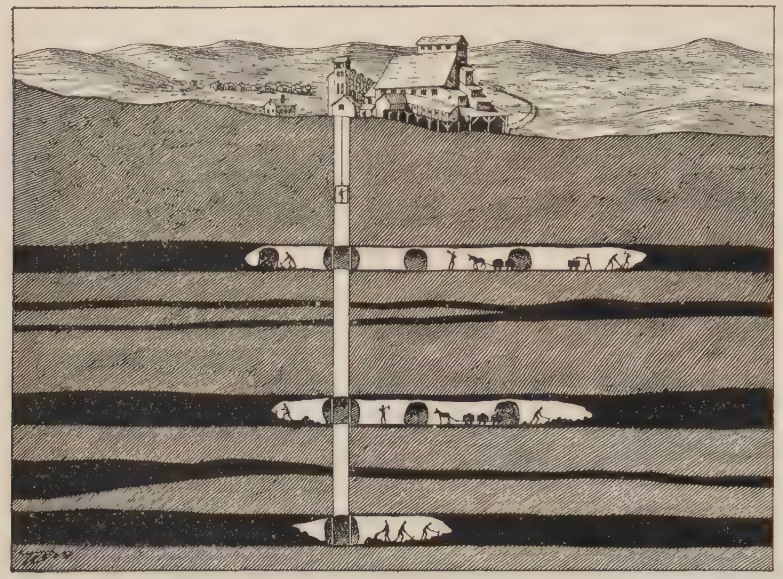

Fig. 23. — A diagram to show the operation of a coal mine
Note the veins of coal; the tunnels; the cross tunnels; and the vertical shaft, with its *cage* or elevator.

According to Fig. 4, you can see that about half of our states produce some coal; but the output from Pennsylvania is nearly a third of that from our entire country. Nearly 700,000 tons are mined every day in this one state, and more than 300,000 men are employed in and about its mines. If the miners' families average at least four members each, as they probably do, how many persons are directly dependent on these mines for a living? About what portion of the entire population of the state?

b. Its abundance in Pennsylvania; and the kinds mined

Anthracite coal (p. 6) comes from the eastern part of Pennsylvania, in the neighborhood of Scranton and Wilkes-Barre and to the south of these cities. This is the only important anthracite field now being worked in the world. In western Pennsylvania about Pittsburgh, as we have learned, bituminous coal is mined. About one third of the state's output of coal is anthracite, the remainder being bituminous coal from this western area.

While anthracite is more difficult to ignite than soft coal, it is cleaner to handle, makes a hotter fire, and produces less smoke; for these reasons it is preferred for many purposes. Which kind is used in your home, and why was it selected?

© *Detroit Publishing Co.*

Fig. 24. — Miners and breaker boys at a coal mine in Pennsylvania
This mine is in eastern Pennsylvania. What variety of coal is mined here?

The miner's task is to get this coal to the surface of the earth ready for distribution. His method is suggested in Fig. 23, where you see a shaft sunk through several beds or seams of coal, and containing an elevator for the use of men and of small coal cars. You can see some miners and also some mules at work below. What are they doing? The tunnels form streets that parallel one another and cross at right angles, much as do those of a city, and a man goes from one layer of coal to another in the elevator, just as he uses an elevator to go from one floor to another in a building.

c. How the miners work

Some coal mines are lighted by electricity, but even in these the workmen more often furnish their own light by means of lamps fastened to their caps. The miners drill holes in the coal beds and break the coal away by blasting, after which the larger lumps are broken into smaller pieces. Then the coal is shoveled into cars, drawn to the shaft by mules or electric engines, and hoisted to the surface.

Perhaps some of the difficulties and dangers of such work occur to you. Do you see how men could become trapped in such a mine? Also that the mine must be ventilated? The need of good ventilation is much greater there than in ordinary buildings, for deadly gases must constantly be driven out.

© *Underwood and Underwood*

Fig. 25. — Drilling for a blast in an anthracite mine at Scranton, Pennsylvania

A hole is drilled some three or four feet into the coal; into this a charge of powder is placed and discharged by a fuse or an electric spark. Thus the coal is loosened. The coal is so hard that it cannot be mined so easily as soft or bituminous coal. The anthracite coal occurs beneath only about 480 square miles of land. The difficulties of mining and the scarcity make anthracite much more expensive than bituminous coal.

While this part of the Northeastern States supplies a vast amount of coal, it produces other kinds of fuel as well. In the rocks of the plateau along the western border of the Appalachian Highland oil and gas are found. *Petroleum*, as the oil is generally called, means rock oil, — a name that suggests its origin. The way in which this is obtained will be discussed on p. 114, in connection with the Southern States, where oil is much more plentiful. Like petroleum, *natural gas* is obtained by boring down to a rock layer where it has been formed. Since the gas is under pressure and very light, it is forced to the surface. It is then piped to houses and factories. Many homes in Buffalo, Pittsburgh, and other cities in western New York and Pennsylvania and in West Virginia are heated by natural gas, and many factories use it as fuel. The western parts of Pennsylvania and New York were once one of the principal sources for these two products;

2. Supply of oil and natural gas

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Fig. 26. — Factories and power plants along the gorge of Niagara River

These factories are only a short distance below the Falls. Many of the factories here use water power, the water being brought from above the Falls by a canal. The building at the foot of the bluff is a power plant; water is conducted to it through the large pipes.

now, however, this region is surpassed by several others (pp. 114 and 150).

Owing to the work of the Great Ice Sheet (p. 9) and to the many mountains in these states, water power is found in almost all sections. The most noted source is Niagara Falls, one of the greatest waterfalls in the world. While these falls belong partly to Canada, they furnish an enormous quantity of power to us for manufacturing, which, in the form of electricity, is used in factories even 150 or 200 miles distant.

3. Abundance of water power

Water power is also developed from many of the streams that flow across the Piedmont Plateau (Fig. 32) in Pennsylvania and Maryland. This is a low, hilly table-land of hard rock, which slopes toward the sea. Nearer the sea is a low plain composed of much softer rock and known as the Atlantic Coastal Plain. From New York to Alabama the streams that flow from the Piedmont Plateau across the Coastal Plain to the sea have dug farther into the soft layers of the plain than into the hard rock of the plateau, and for that reason have formed rapids and falls along the boundary between these two areas. There are so many such falls that this boundary is called the Fall Line. The importance of this water power for manufacturing is suggested in Fig. 112 by the number of cities that have grown up along the Fall Line. Name several of them.

Photo by Major Maxwell

Fig. 27. — An airplane view of Niagara Falls

On the right, on the Canadian side, are the Horseshoe Falls, on the left the American Falls. Goat Island lies between. In what direction was the camera pointed when this photograph was taken? (See Fig. 48.)

Recall the four sources of power that have been named. Unfortunately the raw material most needed in order to make full use of this power is not produced in large quantities within these states. This is iron ore, from which iron and steel are made. Pennsylvania, New York, and New Jersey mine some of it, but the amount is small. Most of what is used here must be obtained elsewhere. This is not difficult, however, for the most valuable iron mines in the world exist along the shores of Lake Superior, whence the ore can be hauled all the way to the south shore of Lake Erie by water. More facts about these iron mines are given on p. 82.

The supply of raw materials for manufacturing

1. Where iron ore is chiefly obtained

Courtesy of U. S. Forestry Service

Fig. 28. — Assembling a raft of logs on the Penobscot River, Maine

The Penobscot River has long been used to float logs to the mills located along its lower course. What city is situated near the mouth? Are these hardwood or softwood logs? Tell how the snows and the spring floods and the current all help to make lumbering cheap in Maine. Where are the markets for this lumber?

There used to be vast forests here; and they are still extensive in the mountainous sections. The dense population, however, calls for an enormous quantity of lumber for such varied purposes as the building of dwellings and the manufacture of furniture, boxes for packing goods, and boats. How great the consumption of wood is for boxes alone is suggested by the fact that a certain book publisher admits spending $30,000 each year for boxes used in packing his output of books.

2. The demand for wood

a. In the form of lumber

Large quantities of wood pulp are also needed for paper, the demand greatly exceeding the supply. Rags were formerly the principal material from which paper was made; but now most of our paper is manufactured from wood, particularly spruce, hemlock, and poplar. By grinding the wood into bits or by use of chemicals, it is reduced to a pulp which is pressed into thin sheets for paper. When one reflects that the term paper includes wrapping paper, pasteboard, writing paper, newsprint, and paper for books and magazines, one realizes what an enormous quantity of wood pulp is needed. About 5,000,000 cords of wood are wanted each year in the United States for paper, a large part of which is used in these states.

b. For paper

The yield of pulp wood per acre varies enormously in different parts of the country and even in the same locality. But in northern New England and eastern Canada five cords per acre is a fair amount. At that rate how many acres of forest are consumed each year in order to meet our demand? How many square miles is that? This estimate is too large, however, for on the Pacific coast, in the Douglas fir region, where the trees are much larger, the yield is sometimes as high as 300 cords per acre. Our country alone cannot meet our requirements for wood pulp; but vast quantities can be obtained from Canada, for there are very extensive forests not far across the boundary.

This section has some important substitutes for wood, particularly for building.

Courtesy of Barre Quarrymen's Association

Fig. 29. — Handling a block of granite, Vermont

The granite block is being hoisted by means of the "block and line" and will be placed on the car, to be taken to the manufacturing plants where it will be shaped and polished.

Clay from which bricks are made is abundant; so also are granite, marble, and slate. At Quincy, near Boston, are some of the oldest granite quarries in the country. Barre, in Vermont, is also noted for its granite; Rutland for its marble; and slate is found in many places. Name several uses of such stone, aside from building.

3. The sources of quarry products

The use of petroleum for fuel is not its only value. There are more than 200 articles of commerce manufactured from it, including ether, gasoline, naphtha, benzine, kerosene, lubricating oil, paraffin, and vaseline. Some of these are valuable in the production of other things: for example, paraffin is used for making candles, wax paper, and chewing gum.

4. Products made from petroleum; how they are secured

In order to obtain these products, the crude petroleum has to be refined. For that purpose it is placed in tanks holding from 600 to 700 gallons each and then heated. The heat causes the oil to evaporate, the lightest part evaporating first, the other parts then following one after another. These vapors are then condensed, and thus the gasoline, kerosene, and other products are obtained separately.

Although large oil refineries have been erected in the South and West, where most of our crude oil is now produced (pp. 114 and 150), much of the refining is still done in the Northeastern and the North Central States. One of the

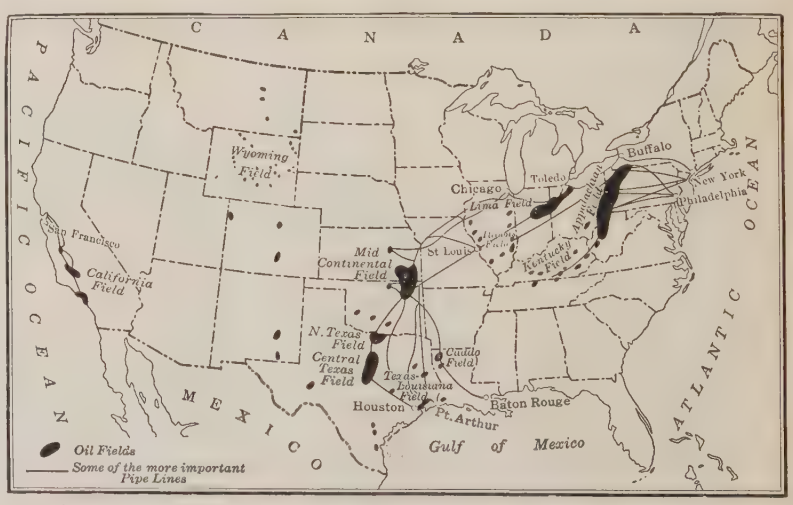


Fig. 30. — Oil fields and pipe lines in the United States (1921)

The size of the field bears little relation to the amount of oil produced. The life of an oil field is short. The wells in the Appalachian and the Lima fields are now producing comparatively little oil.

chief centers for this industry is Bayonne, in New Jersey, across the harbor from New York City; other centers are Philadelphia, Baltimore, Chicago, and Cleveland. Some of the petroleum must, therefore, be transported long distances. As it would be very expensive to haul it by rail, a cheaper way has been found, which is by means of pipe lines laid underground (Fig. 30). The pipes are from four to eight inches in diameter; the crude oil is forced through them by means of pumps placed twenty to thirty miles apart. Some of these pipe lines run only from the great Southern oil fields to the Gulf coast, the oil being refined there or shipped by steamer to the Northern refineries; but others lead all the way to Chicago and even to Bayonne. In view of the large number of products manufactured from petroleum, what reasons can you see for locating refineries so far from the oil wells?

Extent and nature of the manufacturing. — While many of the raw materials that are needed are not produced within these states, the ease of transportation allows them to be brought in without too great expense. Usually it is cheaper to carry raw materials for manufacture to the coal than to carry the coal to the raw materials. After knowing all these facts, you may not be surprised to learn that nearly one half of all the manufacturing in the United States is done in this section. In fact, this is a district where people live in cities rather than in the country; about four fifths of the population is urban. We have already seen that transportation is one of their chief occupations. Manufacturing is another.

Why manufacturing is here a leading occupation

The most extensive manufacturing is that of iron and articles made of iron. The starting point is *iron ore*. Like coal, the iron deposits in the earth were formed long ago, but in a very different manner. Small quantities of iron exist in many minerals and rocks; indeed, the red or yellow color of many soils and rocks is due to it. As water has worked its way through the earth, it has dissolved the iron much as it might have dissolved sugar or salt if they had been there. Where the conditions were favorable, the water carried quantities of the iron to one point and there deposited it. In that way beds or veins of iron ore were formed; it is these that are now being mined. Sometimes the beds are so near the surface that the ore is taken out of great open pits, much as sand is scooped out of a sand pit. There it is soft and loose, like earth, except that it is yellowish or reddish brown and much heavier than earth.

Manufacture of the heavier iron and steel goods

1. What is meant by iron ore, and how it is mined

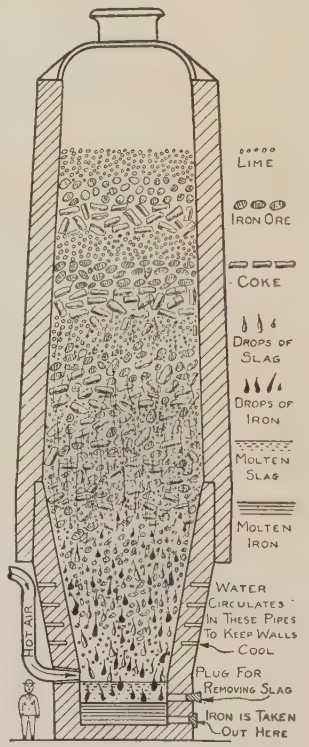


Fig. 31. — Cross section of a blast furnace

Again the veins may lie very deep, where the ore resembles hard, black rock. Then it is mined in much the same way as coal.

The iron ore is not iron, any more than wheat is flour: it is only the stuff out of which iron may be made by a great deal of work. To obtain the iron, two materials, coke and

2. How iron is made from iron ore

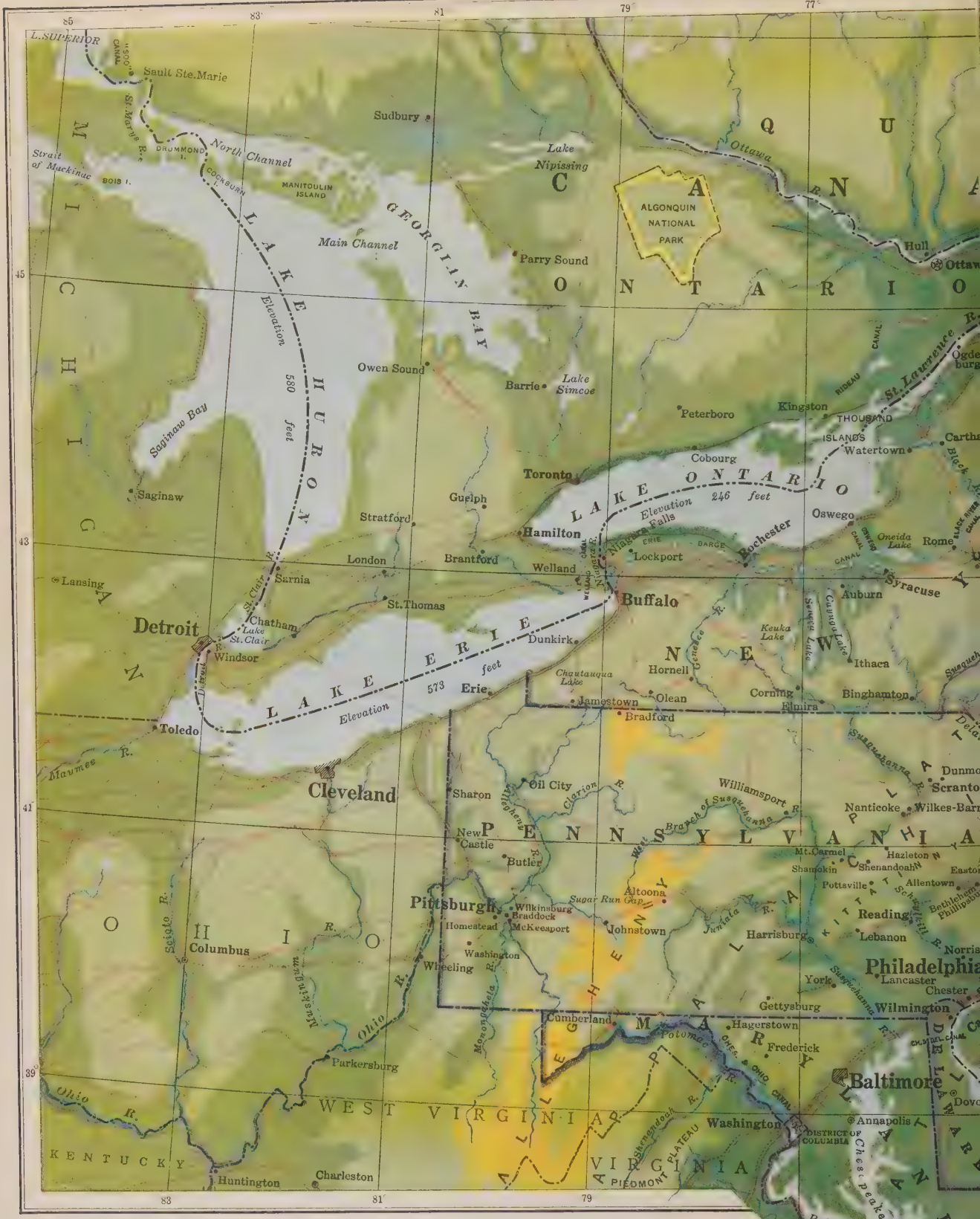

L. SUPERIOR
Sault Ste. Marie
St. Mary's R.
Strait of Mackinac
DRUMMOND I.
BOIS I.
North Channel
COCKBURN I.
MANITOULIN ISLAND
Sudbury
Lake Nipissing
Ottawa R.
ALGONQUIN NATIONAL PARK
Hull
Ottawa
Parry Sound
Main Channel
GEORGIAN BAY
LAKE HURON
Elevation 580 feet
Owen Sound
Barrie
Lake Simcoe
Peterboro
Kingston
THOUSAND ISLANDS
Watertown
Cobourg
Toronto
LAKE ONTARIO
Elevation 246 feet
Oswego
Saginaw Bay
Saginaw
Guelph
Stratford
Hamilton
Niagara Falls
Rochester
Lockport
Oneida Lake
Rome
Syracuse
Auburn
Lansing
London
Brantford
Welland
Sarnia
St. Clair R.
St. Thomas
Buffalo
Detroit
Chatham
Lake St. Clair
Windsor
Dunkirk
Keuka Lake
Seneca Lake
Cayuga Lake
Ithaca
Hornell
Chautauqua Lakes
Corning
Binghamton
Jamestown
Olean
Elmira
Erie
LAKE ERIE
Elevation 573 feet
Bradford
Toledo
Maumee R.
Cleveland
Oil City
Sharon
Clarion R.
Williamsport
Susquehanna R.
Scranton
Nanticoke
Wilkes-Barre
New Castle
Butler
PENNSYLVANIA
Mt. Carmel
Hazleton
Shamokin
Shenandoah
Pottsville
Allentown
Altoona
Pittsburgh
Wilkinsburg
Braddock
Homestead
McKeesport
Sugar Run Gap
Reading
Bethlehem
Philipsburg
Johnstown
Harrisburg
Lebanon
Scioto R.
Columbus
OHIO
Washington
Wheeling
Muskingum R.
Ohio R.
Monongahela R.
Lancaster
Philadelphia
York
Chester
Gettysburg
Wilmington
Cumberland
Hagerstown
Potomac R.
Frederick
Baltimore
Parkersburg
WEST VIRGINIA
Annapolis
Washington
DISTRICT OF COLUMBIA
Chesapeake Bay
KENTUCKY
Huntington
Charleston
VIRGINIA
PIEDMONT PLATEAU
Potomac R.
85
83
81
79
77
45
43
41
39

Fig. 32

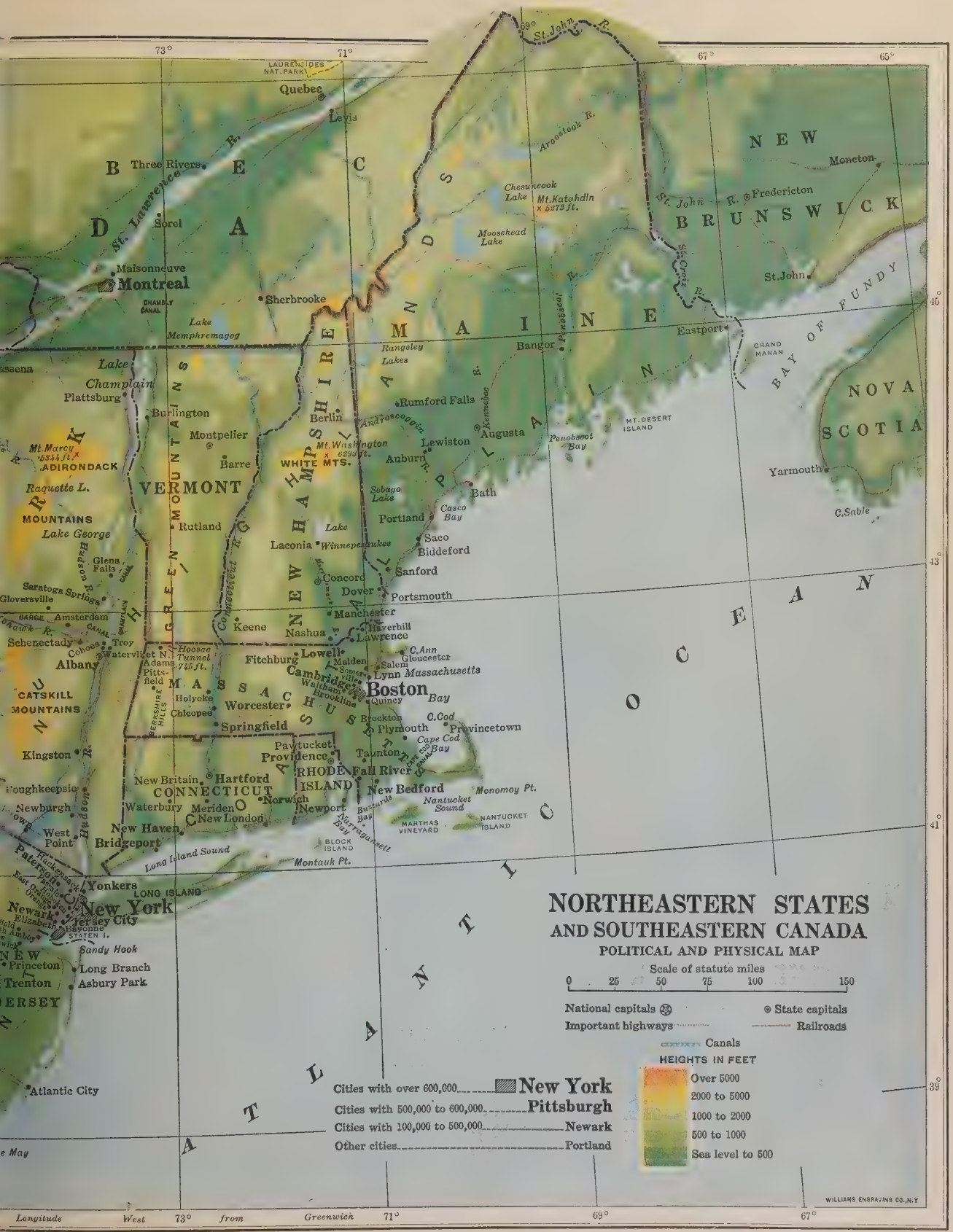
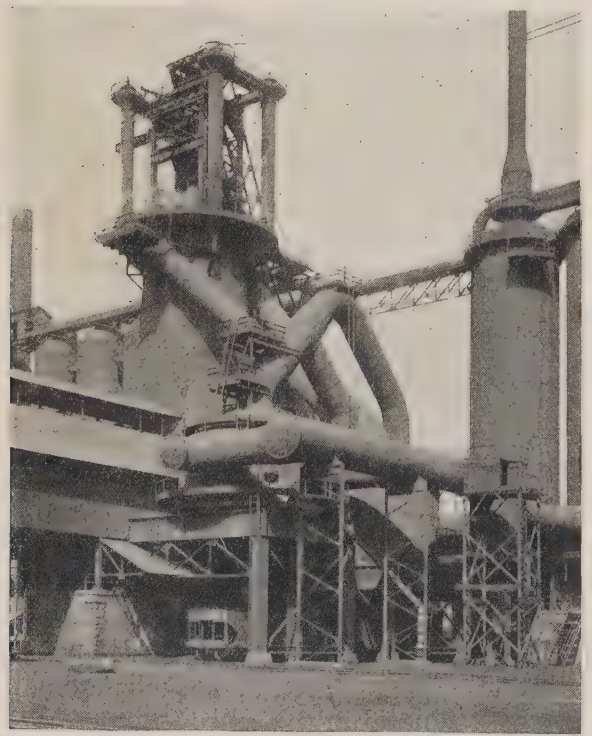

NORTHEASTERN STATES
AND SOUTHEASTERN CANADA
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 25 50 75 100 150
National capitals
State capitals
Important highways
Railroads
Canals
HEIGHTS IN FEET
Over 5000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Cities with over 600,000 New York
Cities with 500,000 to 600,000 Pittsburgh
Cities with 100,000 to 500,000 Newark
Other cities Portland
Longitude West 73° from Greenwich 71° 69° 67°
WILLIAMS ENGRAVING CO., N.Y.
ATLANTIC OCEAN
BAY OF FUNDY
NEW BRUNSWICK
NOVA SCOTIA
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW YORK
Quebec
Montreal
Sherbrooke
Three Rivers
Sorel
Levis
Moncton
Fredericton
St. John
Eastport
Bangor
Augusta
Lewiston
Auburn
Portland
Bath
Rumford Falls
Burlington
Plattsburg
Montpelier
Barre
Rutland
Laconia
Saco
Biddeford
Sanford
Concord
Dover
Portsmouth
Manchester
Nashua
Keene
Haverhill
Lawrence
Lowell
Fitchburg
Worcester
Springfield
Boston
Cambridge
Quincy
Brockton
Plymouth
Provincetown
Cape Cod
Taunton
Fall River
New Bedford
Pawtucket
Providence
Hartford
New Britain
Waterbury
Meriden
New Haven
Bridgeport
Norwich
New London
Newport
Yarmouth
C. Sable
Albany
Troy
Schenectady
Amsterdam
Gloversville
Saratoga Springs
Glens Falls
Rutland
Kingston
Poughkeepsie
Newburgh
West Point
Yonkers
New York
Jersey City
Newark
Sandy Hook
Long Branch
Asbury Park
Princeton
Trenton
Atlantic City
Cape May
Long Island Sound
Montauk Pt.
Nantucket Sound
Martha's Vineyard
Nantucket Island
Block Island
Mt. Katahdin 5273 ft.
Mt. Washington 6293 ft.
Mt. Marcy 5344 ft.
Lake Champlain
Lake Memphremagog
Lake George
Lake Winnepesaukee
Rangeley Lakes
Moosehead Lake
Chesuncook Lake
Sebago Lake
Casco Bay
Penobscot Bay
Mt. Desert Island
Grand Manan
Adirondack Mountains
White Mts.
Green Mountains
Catskill Mountains
Berkshire Hills
Laurentides Nat. Park
Chambly Canal
Champlain Canal
Barge Canal
Hoosac Tunnel 745 ft.
St. Lawrence R.
Aroostook R.
St. John R.
St. Croix R.
Penobscot R.
Kennebec R.
Androscoggin R.
Connecticut R.
Hudson R.
Raquette L.

Fig. 32

Questions on Fig. 32. — 1. How many canals can you find on this map? One in Massachusetts and one in New Jersey might easily escape your notice. Show how the coloring of the map explains the possibility of digging canals at these points. 2. If you wish to find smaller places than are shown in this map in the area of densest population, consult Fig. 500. 3. Consult Fig. 19 to find out which of the states shown in this map are in the group which we are now considering. Notice that only a few of the largest cities outside of this group are indicated on this map. 4. In Massachusetts and in the region immediately surrounding New York City, it is impossible to show cities even larger than those which are shown along the northern border of this map. Consult Fig. 21 to find out why.

limestone, are mixed with the iron ore in a blast furnace. Coke is made from soft coal by driving out some of its gases. It produces a very intense heat when burning and is used to melt the iron ore and limestone. Limestone is used to unite with the impurities in the ore, forming a substance called *slag*, which is so much lighter than the molten iron that it rises to the surface.



Courtesy of E. R. Hayhurst

Fig. 33. — Blast furnace

In Fig. 33 you see a tower-like structure called a *blast furnace*, into which the iron ore, coke, and limestone are dumped together from the top. For each ton of ore about a half ton of coke and one fourth of a ton of limestone are used. In some of the larger blast furnaces 1,500 to 2,000 tons in all are required every twenty-four hours.

In the ordinary furnace for heating houses, the natural draft of air produces sufficient heat; but in the blast furnace air under high pressure is blown in through the bottom, as shown in the figure; hence its name. In this way a very great heat is produced. Note where the drops of slag and iron begin to form. This is the hottest part of the furnace, where the enormous temperature of 3,000° Fahrenheit is reached (Fig. 31).

In spite of such a temperature, there is an interval of about fifteen hours from the time a piece of ore is put in at the top before the iron in it is ready to be removed at the bottom. That shows what a task it is to obtain iron from the ore. From 400 to 800 tons of iron may be produced in twenty-four hours by a large furnace. When such a furnace once starts, it does not stop, but goes on day and night every day in the year, including Sundays and holidays. Do you see any reasons for that necessity? The iron is drawn off every four to six hours, as the raw material is "charged" in at the top. When the iron is drawn off, it is molded into blocks a little larger than a large brick, called *pigs*. They get their name from the fact that formerly the molten iron was run into forms in sand with little branches which resembled pigs lying beside their mother. That is the *pig iron* of commerce, which is

© Publishers' Photo Service

Fig. 34. — The storage yard of the Bethlehem Steel Works at Bethlehem, Pennsylvania

In the foreground is pig iron stacked like cordwood. In the background are piles of iron ore that have just been unloaded from the railroad cars by means of the buckets suspended from the huge derrick. The blast furnaces where pig iron is made from iron ore are just to the right of this view.

as important in the field of industry as flour is among foods.

The blast furnace is the very center of modern industry. The thousands of men in the iron mines are working to keep such furnaces going; so are many of the thousands who mine coal, who change coal into coke, and who quarry limestone. On the other hand, the pig iron that the blast furnaces produce is the principal material used in the hundreds of iron and steel industries in these states.

3. The different kinds of iron

Some iron goods, such as stoves and the iron parts of your school desk, are nothing more than this pig iron melted and cast, in molds, into the shape that is desired. This is *cast iron*, which is so brittle that it breaks under a heavy blow. Other materials, such as knife blades, boiler plates, rails for railroads, and watch springs are made of *steel*. This also is made of pig iron, though not until it has been melted again, purified, mixed with other substances, and greatly hardened and strengthened by a complicated process. *Wrought iron*, a third kind, is used where it is necessary for the metal to be tough and at the same time to bend easily, as in iron wire.

4. Why the heavier iron and steel goods are made in and near Pennsylvania

As has been suggested, the most necessary materials, in addition to iron ore, for the manufacture of pig iron are soft coal and limestone. Pennsylvania leads all the states

Fig. 35. — Molten steel running from an open-hearth furnace

By means of huge buckets and cranes, molten iron and steel are carried to various parts of the plant and poured about as easily as water.

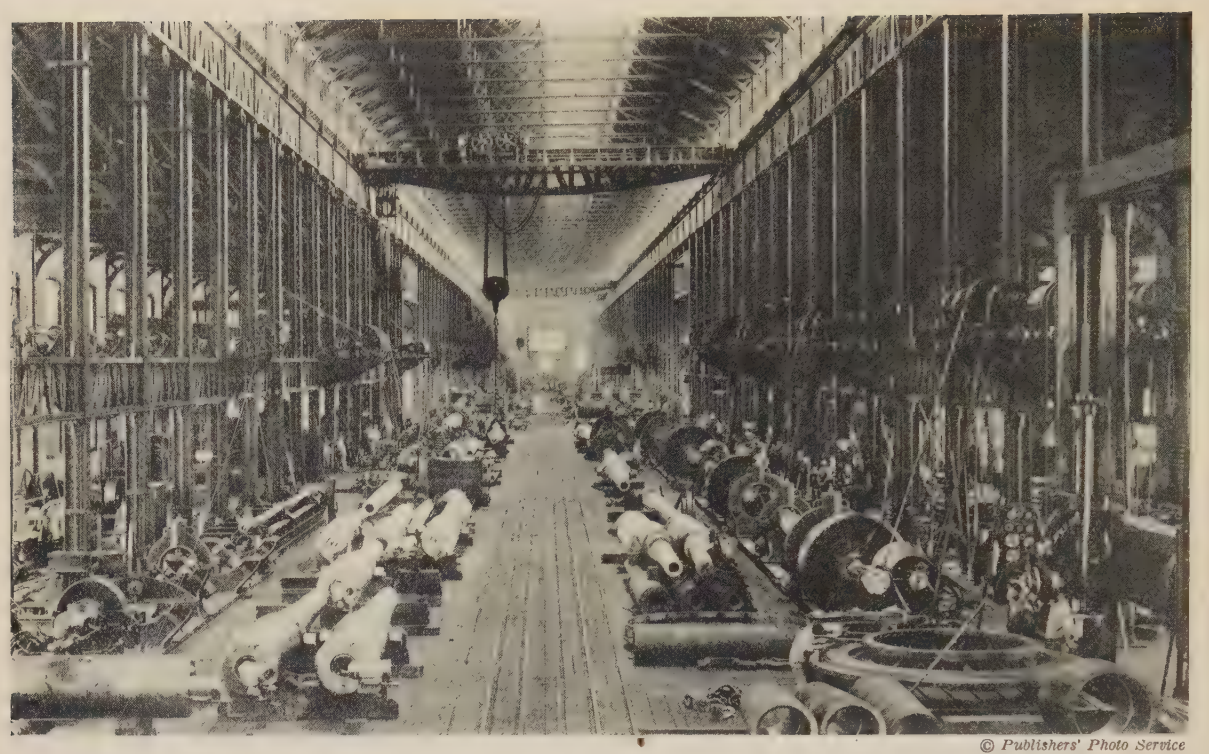


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Fig. 36. — Making cannon at the Bethlehem Steel Works, Pennsylvania

During the World War many steel plants in this country were devoted to the manufacture of cannon, shells, armor plate, and parts of steel vessels. Much of the finishing of cannon is done by machines that work very accurately with only a small amount of attention on the part of the men who have charge of them.

in the production of these two materials; naturally, therefore, it leads them all in iron and steel manufacture. There are about 450 blast furnaces in the United States, but rarely more than 200 or 300 are in operation at one time. About one third of the total number are in Pennsylvania.

The greatest center for such work is Pittsburgh. Buffalo and other cities on Lake Erie produce a great deal of iron and steel, but they suffer a disadvantage because they are farther from the coal supply. Show that this is true. What advantage have they?

Pennsylvania leads all the states, also, in the production of steel and heavy articles made from steel, such as rails, car wheels, locomotives, armor plate for warships, and heavy machinery. Knowing these facts, you have some idea not only of what the cities of Pennsylvania are manufacturing, but also of the manufactures of the other cities within easy reach of the Pennsylvania coal. Make a list of other heavy articles made of iron or steel that have not been named here, such for example as furnaces, elevators, and radiators for heating. Then name and locate the cities of more than 100,000 population that you find in Pennsylvania, New York, New Jersey, Maryland, and Delaware. Most of them are making some of these articles, and the greatest steel centers are undoubtedly manufacturing all the things in your list.

The manufacture of cement also has become very important in recent years. It is made by crushing to a fine powder a mix-

ture of limestone and clay-like rock and then heating the mixture to a high temperature until the moisture in it has been driven off. After this process it is again crushed to a powder. When this powder is mixed with water and allowed to dry or "set," it becomes as hard as the rock from which it was made, and much more durable.

Other kinds of manufacturing in and near the coal fields

1. The nature and importance of cement manufacture

Cement has two great advantages over stone for building. First, it can easily be molded to any form while it is soft, and thus saves the difficult chiseling necessary in the case of rock; and, secondly, no matter how large the structure, small amounts of cement can be carried at a time, while with rock heavy slabs must frequently be used. Indeed, cement might be called "the rock which can be carried in buckets." Make a list of the purposes for which you have seen it used.

When cement is mixed with sand and small stones, crushed rock, cinders, or blast-furnace slag, it is called *concrete*. The cement holds these materials together, thus making it possible to fill up a large space without using a very large amount of cement. When *reënforced* with a skeleton of wires or rods, concrete can take the place of wood and iron in many kinds of building work. What are some of the advantages of having a building made of concrete? Some engineers are of the opinion that the great pyramids of Egypt are made of concrete, which will give you an idea of its durability.

Although cement has long been known, little of it was made in the United States until about 1885, when the discovery of cheap methods of crushing and heating the materials caused a rapid increase in its production and use. In 1920 over 90,000,000 barrels were shipped from our cement plants.

Unlike the automobile industry (p. 84), the manufacture of cement does not tend to be confined to any single section of the country. There are two explanations for this. The first is the high cost of shipping such heavy material. Cement weighs about twice as much as coal, and it must be shipped in closed cars so that moisture cannot affect it. Consequently, in normal times the freight charges for a few hundred miles will double its cost. The second reason is that the materials for manufacturing cement are found in every state of the Union. As a result, the industry tends to be a local one, each plant supplying the territory for a few

Fig. 37. — A limestone quarry

The steam shovel is filling these cars with limestone, which will be taken to factories to be made into cement.

hundred miles around it. On account of the dense population of the Northeastern States, however, the demand there for cement is especially great, and since all the materials for its manufacture, including fuel, are abundant, more of it is produced in this section than anywhere else in the world.

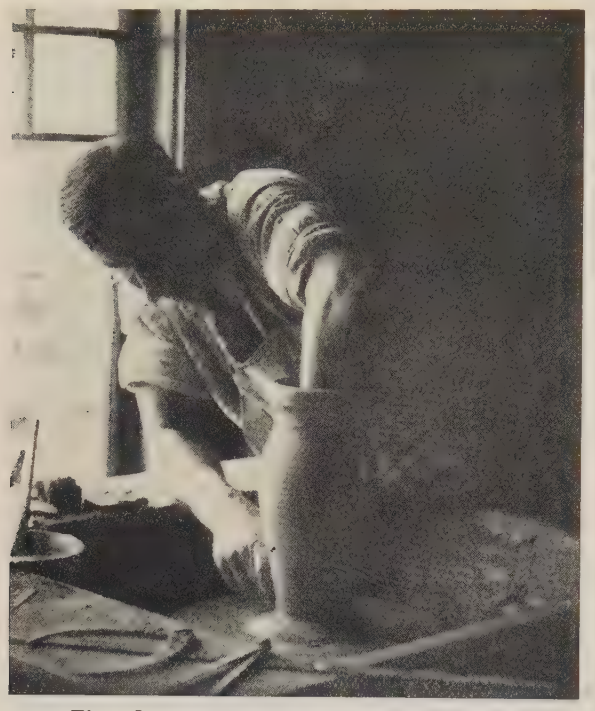

Fig. 38. — A potter making earthenware

Pittsburgh is the greatest center in the United States for the manufacture of glass, particularly plate glass. Near by is found the peculiar kind of sand from which glass is made, when mixed with lime (which is also available here in large quantities) and small amounts of other substances. Not only are all the materials for glass thus easily obtained, but there is a plentiful supply of the fuel required for melting these together.

2. Why Pittsburgh is noted for glass

In the neighborhood of Trenton, New Jersey, is a kind of clay especially suited to the manufacture of pottery. Since fuel is near at hand, the pottery industry there has been extensively developed. Fine vases and chinaware are made, some of the plates for table use selling at retail for as much as $150.00 apiece, or $1,800.00 per dozen.

3. How coal and clay help to locate two other industries

Again, clay suitable for brick is widely distributed, but is especially abundant near Philadelphia and along the Hudson River above New York. The demand for brick is very great in the large cities, especially because danger from fire forbids much use of wood in the construction of buildings. Since fuel is easily obtained at those points, brickmaking has become a very important industry there.

How New England benefits from Pennsylvania coal in metal manufactures. — New England produces practically no coal or iron. It would be at a serious disadvantage, therefore, if it attempted to make the same things that are manufactured in Pennsylvania and its neighboring states; yet, by choosing a different type of metal product, it has become as noted for its metal manufactures as these other states. For example, several thousand Waltham watches are made every day in Waltham, Massachusetts; and many watches and clocks come from Waterbury, Connecticut. The Singer Sewing Machine Works cover many acres in Bridgeport, Connecticut, and Providence is noted for its jewelry. Other metal goods produced in large quantities are tools, firearms, needles, wire, cartridges, cutlery, screws, and locks.

The types of metal articles which it manufactures

There are two reasons for such selection. One is that the articles are very light. New England manufactures some heavy metal goods, such, for example, as heavy machinery that is used in its own factories and for that

The reasons for such selection

reason can better be made on the spot; but most of its products are so light that their manufacture requires a very small amount of coal and of metal. Thus, while dependent on Pennsylvania for fuel, it makes itself as little dependent as possible.

The other reason is that such articles, being distinguished by elegance and finish, require a high degree of skill. A steel rail costs only a few times as much as the pig iron from which it is made; when one buys it, therefore, one to a large extent buys raw material. A watch, on the other hand, may cost a thousand times as much as the few ounces of metal that it contains; and when one buys it, one to a large extent buys skilled labor. The New England industries represent an advanced stage in manufacturing, where quality of labor and skill in workmanship are far more important than the quantity of raw material and of fuel consumed.

New England manufactures one half the total amount of small metal goods produced in the United States. The chief reason why this type of manufacturing is profitable in this district is the large supply of skilled labor. Some of the ways in which it has come to have such a supply will appear later (p. 48).

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Fig. 39. — A portion of one of the cotton mills at Fall River

Fall River is one of the most important cotton-milling cities in the United States, having more than forty large mills. Cotton is easily obtained from the ports of the South by boat.

How other manufacturing in New England is carried on at a disadvantage. — New England produces no cotton, little wool, and few hides for leather. In order to manufacture cotton goods, the cotton must be brought from the Southern States or from abroad. Wool for woolen goods must be brought mostly from the West or from Argentina or Australia. Raw hides and leather for leather goods must also come from our Western States or from foreign countries such as Mexico, Canada, and Argentina.

The surprising rank of New England in the manufacture of cotton, woolen, and leather goods

In spite of these facts and the want of coal, there are nearly 400 cotton mills in New England making such articles as sheets, towels, stockings, underwear, gingham, and calico. There are also many woolen mills making woolen cloth, underwear, blankets, stockings, rugs, carpets, and many other things. There are likewise many tanneries for making leather and many factories for manufacturing such goods as shoes, pocketbooks, harness, and leather bags. One of the largest cotton factories in the world is located at Lowell, Massachusetts, and one of the largest sole leather factories is at Haverhill. New England

Fig. 40. — Rolls of cotton cards in a mill at Cohoes, New York

The cotton has been taken from the bales and cleaned and " carded " into a thick mat, which has been rolled up, as shown in the picture, ready for the spinning machines. In these thread will be made; this, in turn, will be woven into cloth at a weaving mill.

manufactures about one half of all the cotton, woolen, and leather goods made in the United States, which is a fact even more surprising than its extensive manufacture of metal goods.

1. Method of cotton and woolen manufacture

The cotton arrives at the mill in bales, each weighing about 500 pounds, and is made into cloth in the following manner. First, the dirt, small sticks, and other foreign matter are removed. Then the cotton fibers, of various lengths, are combed out straight and well mixed with one another. After that they are pressed into thin, gauzelike sheets. These are gradually drawn out and twisted into threads, and then wound upon spindles and taken to the looms for weaving. All this work is done by machinery.

Cotton cloth is nothing more than such threads woven together, those that extend lengthwise of the piece being called the *warp*, and those across it, the *woof*. An ordinary piece of calico has a warp of perhaps 1,200 threads, while a wide piece of cloth, such as a sheet for a bed, may contain as many as 2,500. Stripes and other patterns are made by printing, or by coloring the threads differently and then, before the weaving begins, carefully arranging them according to some design.

Wool, after being sheared from the sheep, is washed and freed from burs and sticks. It is then untangled and combed out straight, after which it is twisted into yarn, much as cotton is twisted into thread. The yarn is woven into cloth in the same manner as the cotton thread.

Leather is made from the hides of animals, such as cattle, sheep, goats, horses, and hogs.

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Fig. 41. — Looms at work in one of the large weaving rooms in New England

There are several rows of looms in this room and several looms in each row. Each loom is operated as a unit, but the looms are so delicately adjusted that they require little attention by the workers. Such factories have a surprisingly small number of workers when the great amount of machinery is considered.

2. How leather is prepared and made into shoes

After the hair is removed, the hides are taken to tanneries, where they are soaked in *tannic acid* to make them soft and durable.

Some of the tanneries are situated near forests, as in Michigan, where there are many hemlock trees whose bark produces the tannic acid. Others are in the mountains of North Carolina, where there are varieties of oak and chestnut from which tannic acid is made.

Some of the tanneries of New England also are near the forest, but many, like those in and about Salem, are not. To these, both the hides and the bark must be brought a long distance. In some tanneries other chemicals are used in place of the tannic acid from hemlock or oak bark. In a single tannery near Boston, where sheepskins are tanned, from 30,000 to 40,000 skins are prepared each week.

Name as many leather products as you can. Much of the output of the tanneries is used in the manufacture of shoes. After being tanned, the leather is brought to the shoe factories and cut up, one operator cutting out soles of a certain size, a second tops, a third tongues, etc.; these parts are then sewed or nailed together, and the shoes are soon finished. As in the case of cotton and woolen manufacturing, nearly all the work is done by machinery, each person caring for one or more machines and performing the same simple task day after day.

How New England can compete with other regions in the textile and leather industries

New England must compete directly with the Southern States in the manufacture of cotton goods, and with various other districts in all three of these industries. For example, cotton goods are extensively manufactured at Utica; shoes at Rochester and Binghamton,

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Fig. 42. — Workers cutting out parts for shoes in a factory at Lynn, Massachusetts

Why is the manufacture of shoes so prominent in New England? Where does the leather come from? To what parts of our country are the shoes shipped? Do you wear shoes made in New England?

and rugs and carpets at both Yonkers and Philadelphia.

Yet New England prospers, for several reasons. While it lacks coal, it has, as we have already noted (pp. 10 and 34), a great quantity of water power, which gave it an early start. Note the several cities on the lower Merrimac River, all of which make much use of its power. Yet these cities must provide steam also, since the water supply does not meet the demand at all seasons. Explain why it is that other cities, like New Bedford and Fall River (Fig. 32), are so easily supplied with coal from Pennsylvania that the added cost for fuel is not great.

The large number of skilled workmen is,

however, a more important advantage. Because of the long winters and the meager opportunities in agriculture, some of the New England states got an earlier start at manufacturing than the other sections of our country. At first each family made within its own home most of the things it needed, spinning and weaving wool, making clothes, shoes, and harness, and whatever else plain people in a new country required. Later, when the opportunity came to manufacture large quantities of goods in factories, skilled workmen were at hand in large numbers. As in the case of the metal goods, they have chosen to manufacture high-grade articles that call for a special degree of skill.

In the early days of our republic, moreover, many state and national laws were passed that favored factories. After these factories have for some generations sent forth goods of excellent quality, their reputation greatly helps them. In fact, that is now possibly the greatest advantage enjoyed by this section. Whether New England manufacturers will be able to maintain their leadership in the future is a question, for in recent years the Southern States have been taking over more and more of the cotton manufacture, which is the most important of these three industries in New England (see p. 45); small metal goods are being made in increasing quantities in New York, and in Ohio, Illinois, and other states of the Middle West; and the rise of manufacturing on the Pacific coast, particularly in California, is beginning to close the Western markets to certain Eastern products.

The nature of a manufacturing town. — The eleven states of the Northeastern group, as we have seen (p. 37), do nearly one half of all the manufacturing in the United States. In consequence, the cities here are very different in appearance from those in many other sections, for they are chiefly manufacturing centers. For example, New Bedford, with a population of 121,000, has nearly seventy cotton mills, which employ more than 35,000 persons. It also makes silverware, cut glass, rope, leather, machinery, paint, lumber, and oil. Probably more than one third of all its inhabitants are at work every day in factories. Haverhill, with a population of 54,000, employs more than 15,000 in the manufacture of shoes; it has woolen mills in addition, and makes a large quantity of

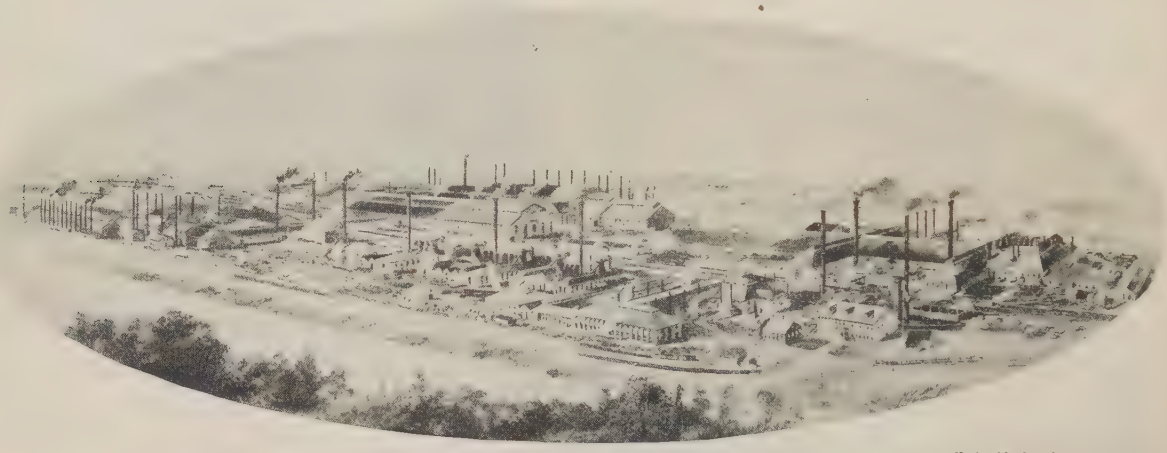

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Fig. 43. — Bethlehem Steel Works

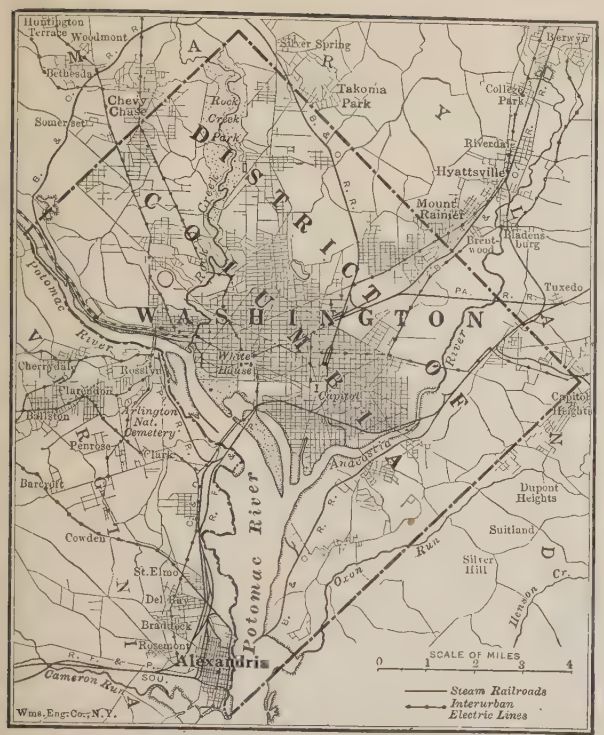

Fig. 44. — The District of Columbia

wooden and paper boxes, brick, cement, and leather. Fig. 43 is a picture of the Bethlehem Steel Works in Pennsylvania. Bethlehem is a city of only about 50,000 population, yet these works employ as many as 10,000 persons. One finds many factories in almost any city in these states; sees the streets thronged with workmen at certain hours in the morning and evening; and discovers that some of the leading topics of interest are raw materials and their manufacture and sale.

How Washington, D. C., differs from such manufacturing centers. — Washington, D. C., however, is a striking exception to this rule. It is unlike the other cities in two respects. Since it was certain that it would one day be very large, it was carefully planned, with wide streets and many parks. For that reason, it is more attractive than a city having a large number of factories. Also, the people are not especially interested in manufacturing and commerce. Here reside the President, members of Congress, the judges of our Supreme Court, and the representatives of the other great nations of the world.

Photo by Manufacturers' Aircraft Assn.

Fig. 45. — An airplane view of a part of Washington, D. C.

What building or buildings in this picture do you recognize?

Thousands of men and women are at work in the various departments of the government, and there are always many visitors. The principal buildings, therefore, are not factories and private offices, but government offices, apartments, and hotels, and the chief interest is in matters of government. It is because of this different interest that Washington is controlled directly by the national government. The population in 1920 was 438,000. The District of Columbia, in which Washington is located, gives the city plenty of room to expand without encroaching on the neighboring states. During the World War more than 100,000 employees of the government resided there; but now that number is considerably reduced.

Fig. 46. — Philadelphia and its suburbs

The great cities. — The four largest cities in the Northeastern States are New York, Philadelphia, Boston, and Baltimore. Locate each. Why should Philadelphia and Baltimore be regarded as coast cities, since they are located so far inland?

Why the cities on the coast are the largest

1. Their superior advantages for transportation

Just as these Northeastern States owe much of their importance to the fact that they lie directly between the interior of the United States and Europe, so the cities just named owe their present importance largely to the fact that they are the principal gateways between these two continents. Most of our imports enter by these ports and most of our exports leave by them. When an ocean liner docks in any of these cities, its hundreds or thousands of passengers must be transported over the city in all directions, and its thousands of tons of freight keep scores of longshoremen and truckmen busy for several days unloading it and carting it away to stores, trains, and other boats. Thus the arrival of a single ship gives work in transportation to hundreds of persons. Many ships arrive and many leave every day, and scores of trains enter and leave the city every hour. Thus transportation is one of the occupations that has attracted so great a population to these centers.

2. Their advantages for manufacturing

Because people and freight can reach and leave these points so easily, they are excellent locations for factories. Neither fuel nor raw material for manufacture is produced in large quantities very near any one of them; but they can all obtain such things so readily, and can ship manufactured articles away so cheaply, that they are admirably situated

for manufacturing; this, in fact, is the second great industry that has brought together so many people in each center.

The city directly west of Boston that most nearly approaches it in size is Buffalo. Compare their populations (p. 481). Name and locate the leading cities between the two; between Boston and New York. West from Philadelphia and Baltimore the leading city is Pittsburgh. Compare it with Baltimore in population. Both Buffalo and Pittsburgh are, like the coast cities, gateways between the East and the Middle West. Show some of the advantages they enjoy both for transportation and for secur-

How Buffalo and Pittsburgh serve as gateways to the Middle West

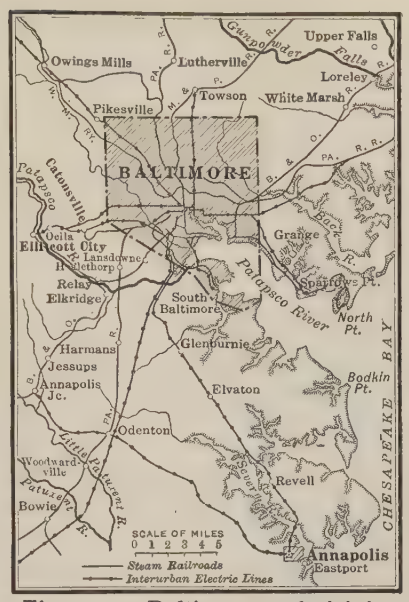

Fig. 47. — Baltimore and vicinity

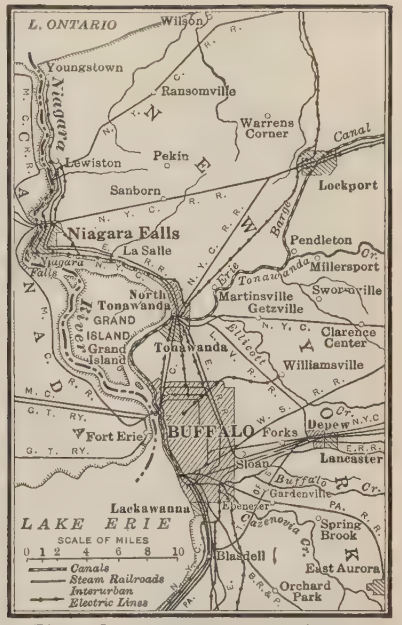

Fig. 48. — Buffalo and vicinity

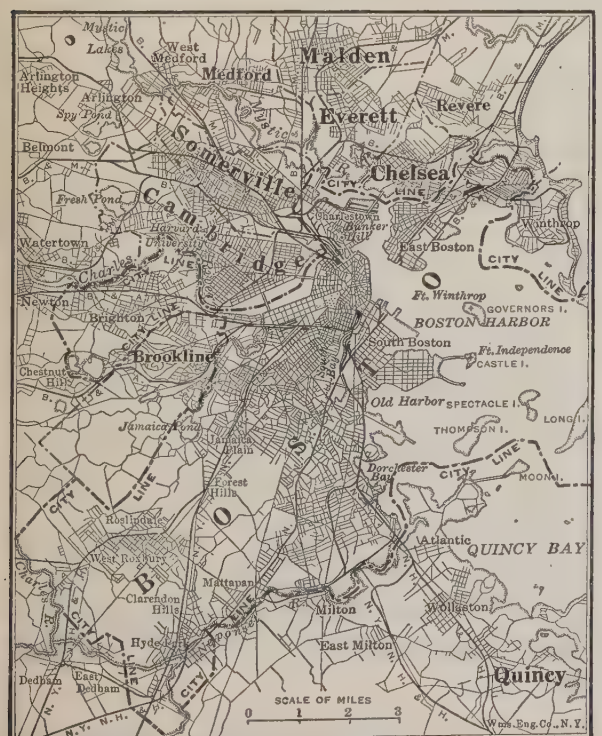

Fig. 49. — Boston and vicinity

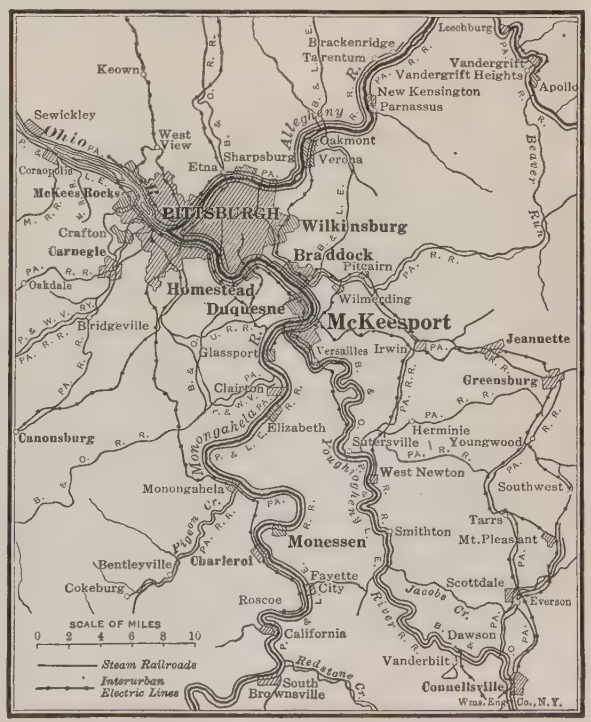

Fig. 50. — Pittsburgh and vicinity

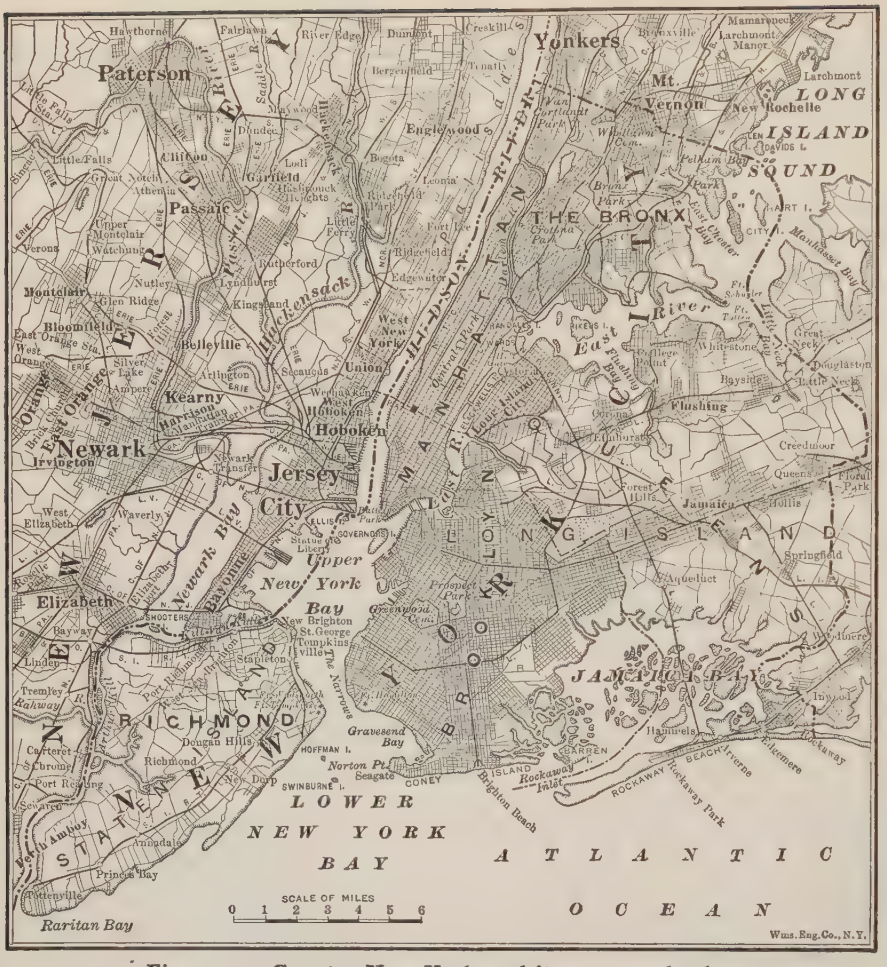

Fig. 51. — Greater New York and its many suburbs

Locate the five boroughs of New York City. Note the large number of cities north and west of New York. How would you expect the shape of Manhattan Island, the business center of New York, to affect the ease with which people pass to and from their daily work?

ing raw materials for manufacture. Thus Buffalo has become the second city in the world in the manufacture of flour (see pp. 76–78). For what industries is Pittsburgh noted (pp. 42 and 44)? The fact that the coast cities are larger, however, indicates that their communication with all parts of the world by water is a matter of great importance. It is their location more than any other fact that has caused their growth.

New York City is nearly twice as large as Philadelphia, Boston, and Baltimore together.

Ways in which New York surpasses the other coast cities

1. Its size compared with theirs

Each of these four has other important cities near by. Name those in the neighborhood of New York, and note their population. Which is the largest? Name also those near Philadelphia; near Baltimore; near Boston. If to each of these four cities we add the population immediately surrounding it, New York would still contain nearly twice as many people as all the others together, *i.e.*, more than 7,000,000. It is the greatest mass of people in so small an area in the world.

To a similar degree, New York leads in amount of business. Nearly one half the total imports and exports of the United States go through its harbor, Philadelphia ranking next but having only one seventh as much foreign commerce. Not only has New York water and rail connection with Buffalo, but the principal railroads that run west and southwest from Philadelphia and Baltimore have terminals at New York. Trace these various routes in Fig. 233.

2. Its leadership in important lines of business

Its lead in manufacturing is shown in the fact that the value of its manufactures is about one tenth that of all the goods made in the United States. While it makes metal goods very extensively, its leading manufacturing industry is the making of clothing. Nearly one half of all our ready-made clothing comes from this city.

New York's business center is the most imposing group of buildings in the world. It occupies the southern half of Manhattan Island, covering an area about six miles in length and averaging hardly more than two miles in width (Fig. 51). Many of the chief business houses of the country have their headquarters in this section; and since the available floor space for offices and warehouses cannot be increased except by building many-storied structures, here is the greatest collection of tall buildings in the world, some of them containing offices for 10,000 to 12,000 persons. On account of the number and height of the buildings, many of the streets resemble deep canyons and are so narrow that they are greatly congested.

3. The impression it makes as a great city

Several square miles of this area are given up to the wholesale trade. Goods manufactured in the city, together with those brought from all parts of the earth, are collected in this section; and merchants from distant cities purchase from among them the wares for their own stores. Here, also, are some of our greatest banks. New York is now the leading money center of the world. The center of the banking business is a short street called Wall Street.

© *U. S. Air Service*

Fig. 52. — The southern end of Manhattan Island

In no other city in the world are there as many high buildings as in New York. In the foreground, at the left, is the approach to the Brooklyn Bridge. At the extreme right are the Woolworth Building and the City Hall. — This photograph was taken from an airplane; the camera was pointed toward the southwest.

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Fig. 53. — Grand Central Station, New York City

Only the front of this immense railway station is shown here. There are large waiting rooms, restaurants, and stores beneath the street level. In the background is one of the largest hotels in the world.

How food is obtained for so many people. — To furnish food for such a dense population a vast extent of good farm land is needed; and there is far from enough of it in the Northeastern States. Mountains and ridges make agriculture impossible over large areas. Locate the White Mountains; the Green Mountains; the Adirondacks; the Catskills; the Alleghenies. About how much of Pennsylvania and New York is mountainous? How much of New England? The Great Ice Sheet, moreover, left many of the more level areas in a bad condition for farming. Not only did it scrape away the soil from many places and leave the surface very rough, but even where the soil is thick it left many areas strewn with bowlders.

Advantages and disadvantages of these states for farming

1. Drawbacks common to this entire section

Farming in New England suffers from other disadvantages. These states lie so far north that they naturally have a severe climate. Fig. 12 shows that most of New England lies in the belt of *mild summers and extreme winters.* For these reasons farming in New England has not flourished except in small districts where great care has been used to increase the fertility of the soil. In some sections, where the soil is thin and markets are distant, farms have been abandoned; the houses and barns are tumbling down and the orchards are grown up in weeds. Owing to the special demand for food in recent years, some of these farms are again coming under cultivation; but they can never prove very productive. Only about one third of the surface of New England is improved land; this is in striking contrast with Illinois and Iowa, where more than four fifths is improved.

2. Special handicaps of New England

The other states are not so handicapped. The Ice Sheet did less damage to them,

Fig. 54. — A group of farm buildings in the southwestern part of Maine

Many other farms in this region have buildings very similar to these.

partly because it covered only a portion of their surface. Trace its southern boundary in Fig. 55. Their more southern position also gives them a warmer temperature. How large an area in this group of states lies in the belt of *hot summers and cold winters?* In these states about twice as much of the land is improved as in New England.

The superior advantages of the other states in the Northeastern group

In the early days New York and Pennsylvania were noted for the production of wheat, and Rochester was a great flour-milling center. Large crops of wheat and oats are still raised; but the Northeastern States cannot raise cereals to the same extent as those farther west, where the land is level, the soil deep, and the farms large; and, on account of the cooler summer climate, corn does not mature so readily.

Why truck-gardening and dairying flourish

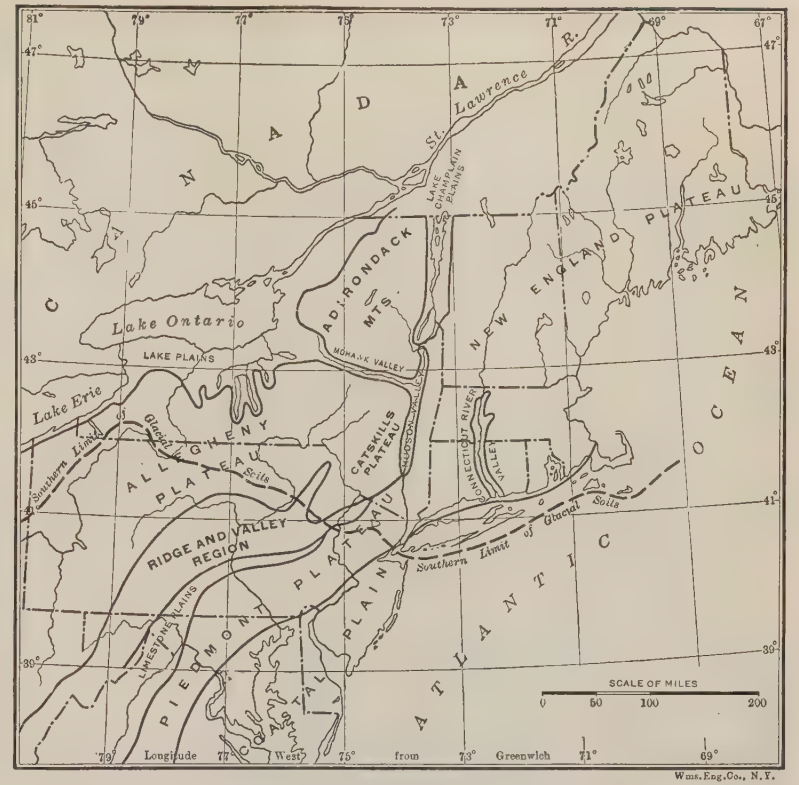


Fig. 55. — Land regions of the Northeastern States

Most of the highland regions have thin soils. The best agricultural lands are found in portions of the Piedmont Plateau, the limestone plains, the lake plains, and the valleys. Name the chief river valleys. The soil of the Coastal Plain is sandy, but excellent for truck gardening.

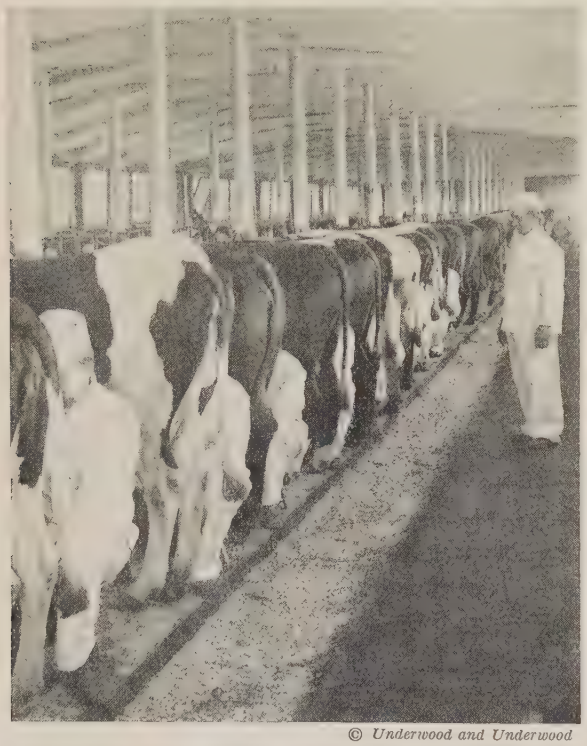
Yet the numerous large cities are the best of markets for all the vegetables and small fruits that the gardener can grow. Truck gardening is, therefore, very important in the neighborhood of all the cities. Sweet corn, too, is one of the leading products, since it does not have to be left to ripen, but is marketed green.

The great demand for milk, together with the fact that much of the land can be used for little else than grazing, makes dairying another important industry. Milk is hauled to New York every day from places 200 and even 300 miles distant; some notion of the magnitude of the work is given by the fact that the union of men in the metropolitan district employed in connection with the delivery of milk consists of 12,000 members. This district includes New York City and the other cities near by in New York and New Jersey. What a number of farmers, farms, cows, trains, and milk wagons in New York State, New Jersey, Pennsylvania, and even New England are kept busy supplying milk to this one center! Yet the area immediately surrounding New York City represents only about one fourth of the population, and therefore of the

demand for milk, in the Northeastern states.

Since there are several sections where fruit trees flourish, fruit raising is extensive. New York and Pennsylvania are noted for apples. One of the most productive regions is that just south of Lakes Ontario and Erie, where the cool winds off the lakes in the spring retard the budding of the trees so that few are harmed by late frosts. Frosts are also less frequent in the spring near large bodies of water. Apples, peaches, plums, and grapes are raised in this region in large quantities. Southern New Jersey, Delaware, and Maryland are also noted for their fruits. Here the winds from the ocean and the bays exert the same influence as do those from the lakes.

Conditions that favor extensive fruit raising



© *Underwood and Underwood*

Fig. 56. — Milking time in a New Jersey dairy

Most of the milking in the dairies of our country is still done by hand. Milking machines are used only to a slight extent. What sanitary measures do you think are being observed here to insure pure milk? What is probably the chief market for the milk of this dairy?

The truck farming, dairying, and fruit raising lead to considerable manufacturing. Many farmers are engaged almost entirely in raising vegetables and fruit for canning; and probably as much corn, and as many tomatoes, peaches, and berries are preserved in cans as are eaten fresh. The fruits are useful in other ways also: the juice of the grapes is bottled fresh, and that of apples is made into cider and vinegar. While most of the milk produced within easy reach of the cities is sent to them fresh, a large part of that produced at a great distance from the cities is made into condensed milk, butter, or cheese. Can you see the reason for this?

Influence of the farming on manufacture of foods

There is one product that seems insignificant, which all of us, nevertheless, must have: and that is salt. Its importance is suggested by the fact that in some countries it has been used as money. Its most familiar use at present is as a seasoner of food; but it is also a necessary food for animals, and is valuable in preserving meat and fish, in making soda, and in several other ways. Our country produces about 7,000,000 tons of it each year, most of which is consumed by us.

Other sources of food

1. Salt

a. Uses of salt

New York is our second state in production of salt, ranking next to Michigan in amount. The salt produced in New York comes from salt beds that lie deep within the earth west and south of Syracuse. They were deposited in a sea that covered this region before the coal period, and were later buried beneath layers of rock, much as the coal beds were buried.

b. Where and how it is obtained

It can be obtained in either of two ways. In one case a small hole is bored to the bed and water is allowed to run down and dissolve the salt. Then the brine is pumped up, and the water is evaporated by heat until only salt is left. In the other case, a shaft, large enough for men to pass up and down, is sunk down to the salt; then lumps of it, called *rock salt*, are broken off the beds and hoisted to the surface. Thus it is mined much as coal is; but a salt mine presents a striking contrast to a coal mine, since its walls and floors are clear, crystal white.

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Fig. 57. — Drying cod at Gloucester, Massachusetts

Gloucester is one of the most important fishing ports in the world. About 6,000 of its inhabitants are engaged in this occupation.

While the farm products of these states are meager, sea food is very abundant along this coast. Formerly great numbers of mackerel, halibut, and cod were caught close to shore, a fact suggested by the name Cape Cod. Although they are now found farther out, hundreds of vessels and thousands of men are engaged in catching them. Many go as far as the Banks of Newfoundland (p. 188), where fish have always been abundant.

2. Fishing

a. Extent and variety of fish

Shad are caught in the bays and rivers. They go up the streams each spring to lay their eggs, or *spawn*, in fresh water; and the young remain there until they are large enough to venture out to sea. It is while on their way to or from the spawning grounds that most shad are caught. Other common kinds of sea food are bass, herring, lobsters, clams, and oysters. The oyster crop in the United States is far greater than that of all the rest of the world, about 37,000,000 bushels being produced by us each year; and the industry is increasing in importance. Chesapeake Bay, because of its great area of water that is less salty than the open ocean, is the most important center for oysters in the world.

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Fig. 58. — An oyster lugger at Baltimore

This small sailing boat is used to harvest oysters in Chesapeake Bay. Chesapeake Bay is the greatest oyster-farming region in the world.

Most of the mackerel are caught in spring and summer. They swim together on the

surface of the ocean in such numbers, or *schools*, that they may easily be seen from a distance. The fishermen who cruise about in search of mackerel sail in swift power-boats, propelled by gasoline, and in two-masted sailing vessels, called *schooners*. When they see a "school" they spring into their boats, row over to the fish, drop a large net, or *seine*, into the water, and draw it around the "school." Then the seine is drawn in, forming a pocket and trapping the fish. In this pocket enough fish are sometimes caught to fill many barrels.

b. Methods of catching the fish

Halibut and cod cannot be caught with a seine, for, instead of swimming at the surface, they live on the sea bottom. Halibut are very large, some weighing more than a man, and they are often caught upon single lines. Codfish may be caught in the same manner, though a *trawl* is more commonly used for cod than for halibut; this consists of a number of hooks hanging from a single long line, all lowered into the water together and left there for hours. The fish swallow the bait on the various hooks, and in this way many are caught at one time.

Such fishing is dangerous, because the men must venture out in small, flat-bottomed boats, called *dories*, to take the fish off the trawls. While they are doing this, a storm may arise or a heavy fog come up and prevent their return to the vessel. They are then left in open boats far out upon the ocean. Every year fishermen from Gloucester, the most noted fishing town in Massachusetts, are lost in this manner.

Dependence of these states on other regions

The people in these states would soon suffer from hunger if they had to depend on themselves for food. Only about one fifth of the population are farmers; and many of the principal foods, such, for example, as wheat, oats, corn, and meat, must be obtained mainly from other regions. Few of the more important agricultural products are grown in sufficient quantities to satisfy the local demand; even vegetables are shipped in large amounts from the South.

The inhabitants are fully as dependent upon outsiders in regard to their manufactures. Most of their raw materials must be brought from distant places, and a good share of their finished goods must be sold elsewhere. Thus this part of our country is greatly dependent on the other sections and on foreign countries.

The development of the railroads. — Such enormous quantities of raw material for manufacture and of food must be transported that the railroads and water routes have an exceedingly important work to do. Most of it falls upon the railroads, for in comparison with them the inland waterways, with one exception (see p. 30), are not important. If the railroads were to stop operation for only a few days, food in these states would become scarce and the factories would close.

The dependence of industry upon them

There are many important railroads here, which are often spoken of as *systems*, the word system meaning a group of roads under one management. Examples are the New York Central system, the Baltimore and Ohio system, and the Pennsylvania system.

The meaning of a railroad system

What is meant by that term is suggested in Fig. 59. All the roads shown there, between New York City in the East and Chicago and St. Louis in the Middle West, are under the control of one company and make up the Pennsylvania system. Its main lines are shown in heavy ink, and its branch lines are lighter. Notice how many branch lines there are, and the states in which they

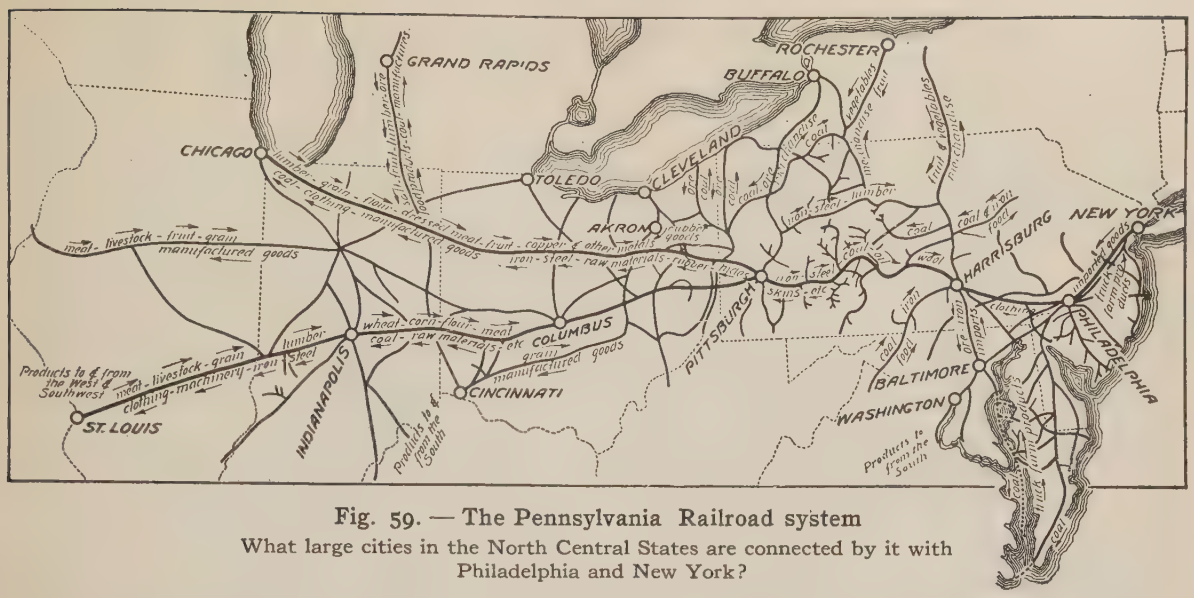

Fig. 59. — The Pennsylvania Railroad system
What large cities in the North Central States are connected by it with Philadelphia and New York?

are principally located. What points do they connect, and what do they carry? What goods are carried each way on the main lines? What reasons can you give for the selection of such goods?

Almost one tenth of the railroad traffic of the United States is carried on this system. Altogether it has 11,500 miles of track, 4,000 locomotives, 3,300 passenger cars, and 162,000 freight cars. Of the last, 105,000 are coal cars. More than one half of all the freight carried by the Pennsylvania system is the product of the mines. About one sixth of the freight consists of manufactured goods. Which of the two would you expect to have the greater value?

This system employs about 250,000 men; and since one employee is the head of a family of not less than four persons, on the average, you can get some idea of the number of persons directly dependent upon this road for support. In addition, many others are indirectly dependent upon it, such as, for example, those engaged in manufacturing the cars, rails, and locomotives; the miners who supply it with coal; and the storekeepers who sell goods to its employees.

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Fig. 60. — Crawford Notch in the White Mountains, New Hampshire

The beauty of the White Mountains — the wild gorges, numerous waterfalls, dense forests, and swift streams — makes the region a summer resort much visited by people from the near-by cities.

Although this system is very extensive, how small a portion it makes of all the roads in our Northeastern States can be seen by comparing Fig. 59 with Fig. 233.

Relief from city life. — A large portion of the city people are confined in factories, stores, and office buildings throughout each day. Most of their homes are not separate houses, but apartments or flats, which generally admit fresh air and light from only one or two sides, and which very often have no front or back yard. Thousands of children in New York have never seen a yard or garden; the streets and all open spaces about them, except the parks, are paved. In all the large cities the sidewalks and streets are the principal playground for many of the children, in spite of their crowded traffic and the danger from automobiles.

Why city people need vacations

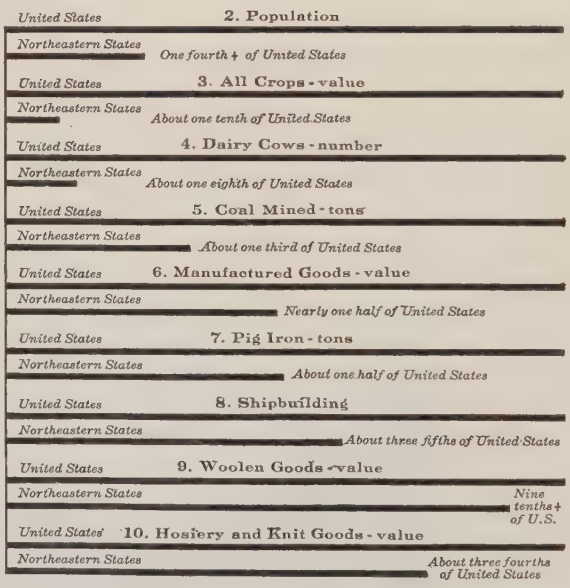

United States 2. Population
Northeastern States One fourth + of United States
United States 3. All Crops - value
Northeastern States About one tenth of United States
United States 4. Dairy Cows - number
Northeastern States About one eighth of United States
United States 5. Coal Mined - tons
Northeastern States About one third of United States
United States 6. Manufactured Goods - value
Northeastern States Nearly one half of United States
United States 7. Pig Iron - tons
Northeastern States About one half of United States
United States 8. Shipbuilding
Northeastern States About three fifths of United States
United States 9. Woolen Goods - value
Northeastern States Nine tenths + of U.S.
United States 10. Hosiery and Knit Goods - value
Northeastern States About three fourths of United States

Fig. 61. — The Northeastern States in comparison with the entire United States

To those who live in the large cities, the country, with its green valleys, its wooded mountains, its rivers, its cool seacoast, and its birds and flowers, is the most inviting place in the world; and hundreds of thousands of the more fortunate city dwellers hasten to it as soon as their vacation time arrives. One of the most popular resorts is the White Mountains in New Hampshire. The Adirondacks and the Catskills are also crowded with visitors in summer. Locate these mountains. Mountain climbing, canoeing, and fishing are some of the more common sports. Many settle down at farmhouses to take walks and enjoy the scenery and the quiet of the country. Great numbers go to the seashore, to escape the heat and to enjoy boating and bathing. The entire coast from Maine to Maryland is dotted with summer cottages and hotels. The most popular of all these resorts is Atlantic City on the New Jersey coast. Its permanent population is only about 50,000, but it is said to have 1,200 hotels and boarding houses and to entertain from 300,000 to 400,000 visitors each summer. At the height of the season as many as 90,000 persons go bathing there in the surf each day.

How they spend their vacations

Facts to be especially well fixed. — 1. Location of the twelve largest cities. 2. Of the six principal rivers. 3. Of the principal mountains. 4. List

of principal farm products. 5. Of principal minerals and manufactures. 6. How New England differs from the other states in manufactures and why?

Problems for independent study. — 1. Make a drawing of New England, showing state boundaries and principal mountains, rivers, and cities. 2. Make a similar drawing of the remaining states in this group. 3. Here is a question for debate: *Resolved*, that it is advisable to use all the water of Niagara needed for manufacturing, even though it destroy the beauty of the Falls. Carpenter, F. G.: *North America*, Chapter XXVI (American Book); National Geographic Magazine, 1916, vol. 29, pp. 346–354; World's Work, vol. 12, pp. 7524–7535; Outlook, vol. 81, p. 696; vol. 83, p. 106; Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 92–98 (Macmillan). 4. Make a model lock, to show how boats are raised and lowered in canals. 5. Write a composition telling the story of a lump of coal. Allen, N. B.: *Geographical and Industrial Studies: United States*, Chapter XI (Ginn); Carpenter, F. G.: *North America*, Chapter XXVIII; Cooke, A. O.: *A Visit to a Coal Mine* (Doran); Tappan, E. M.: *Diggers in the Earth* (Houghton Mifflin); McMurry, C. A.: *Type Studies from the Geography of the United States*, pp. 63–80 (Macmillan). 6. Much coal from Pennsylvania goes to Canada. What routes do you think it might well take? 7. Study the uses made of concrete in your home community, especially in the case of (1) buildings; (2) sidewalks; (3) roads; (4) ships. 8. Make a list of the articles in your schoolroom made of cast iron, wrought iron, and steel. 9. Why was the original Erie Canal built to Lake Erie rather than to Lake Ontario? Does the present Barge Canal connect with Lake Ontario? 10. How is maple sugar made? Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 77–79; Carpenter, F. G.: *North America*, pp. 89–90; Chamberlain, J. F.: *How We Are Fed*, pp. 87–90 (Macmillan). 11. How do the many lakes of New England help to insure a constant flow of water in the rivers? Mill, H. R.: *International Geography*, pp. 725–726 (Appleton); Tarr, R. S.: *New Physical Geography*, pp. 165–167, 299 (Macmillan). 12. Why should not Baltimore have been located at the mouth of the Susquehanna River? 13. Debate this question: *Resolved*, that the country makes a better home for boys and girls than the city. 14. Locate West Point and Annapolis, and explain their importance. 15. Locate the following universities: Harvard; Yale; Columbia; Princeton; Pennsylvania; Johns Hopkins; Cornell. 16. Here is another question for debate: *Resolved*, that the United States should aid Canada in developing a ship canal from Lake Huron by way of the St. Lawrence River to the Atlantic Ocean. Some of the matters to be considered would be the following: what has already been accomplished in this direction; the distance that would be saved from the North Central States to Europe; present difficulties of shipment from those states to Europe; improvements that would be necessary and their cost; benefit or injury to New York State; the water power that could be obtained from the St. Lawrence River; fitness of lake vessels for crossing the ocean; slow rate of movement of vessels through canals; the length of the season of navigation. Adams, C. C.: *A Textbook of Commercial Geography*, pp. 191–192 (Appleton); Mill, H. R.: *International Geography*, pp. 684–685; Trotter, S.: *The Geography of Commerce*, pp. 132–136 (Macmillan). 17. In any of the standard magazines, study the advertisements of small metal goods, and make a list of the articles advertised. Note the cities in which these articles are manufactured and locate them on the reference map (Fig. 499 or Fig. 500). From a study of these advertisements, list some of the articles manufactured in New England; in New York; in Pennsylvania. 18. Why has New York grown to be the largest city in the world? National Geographic Magazine, 1918, vol. 34, pp. 1–49; Hotchkiss, C.W.: *Representative Cities of the United States* (Houghton Mifflin); McMurry, C. A.: *Larger Types of American Geography*, pp. 195 ff. (Macmillan). 19. Show how a strike, or any other condition causing a complete stoppage or merely a shortage of coal, would affect our lives. National Geographic Magazine, 1917, vol. 32; 1918, vol. 34, pp. 407–434; Journal of Geography, 1918, vol. 16, pp. 226–227. 20. Make a collection of wool, showing as many of the stages from the raw wool to the finished cloth as possible. Write to the American Woolen Mills, Boston, Mass., for their little booklet, *From Wool to Cloth*.

How to find the books you need in a public library. — In addition to your own classroom

library, you will often find it helpful to use the public library. Every library has one or more librarians who help its users to find what they want. They know exactly where everything is and how to get it quickly. The librarian is always willing and ready to assist you.

The help the librarian can give you

However, if you go to the library often, you ought not to trouble the librarian every time. There are other means by which you may find what you want.

How the card catalogue can help you

When you have asked the librarian whether or not she has a certain book, you have probably noticed that she goes to a large case with many drawers, on the outside of which are the letters of the alphabet. In these drawers are many cards. This is the *card catalogue*, or a series of cards arranged alphabetically like your dictionary, which contains the names of all the books in that library. On each card is the name of a book, its author and publisher, sometimes a very brief description of its contents, and the library number.

Let us suppose that you are hunting for information on the production of wheat in the United States. The most natural place for you to look will be under the name of the industry, *Agriculture*. Go to the drawer marked *A* and look for that subject. Its various branches will be found under such headings as: *Corn*, *Oats*, *Rye*, *Wheat*, etc. Under the classification of *Wheat* a number of books are named, but they may not be what you need. Finally you come to this card:

J 917.2 Bengtson, N. A., and Griffith, D.: The Wheat Industry.

A treatment of the processes of wheat production in Argentina, Canada, the United States, and other great countries, by N. A. Bengtson and D. Griffith. New York, The Macmillan Company (1915).

Tell the librarian the number 917.2. The letter "J" before the number indicates that it is in the juvenile or children's department. She will get the book for you very quickly, for she knows the shelf on which the books of that number are kept. You will then turn to the index and find the pages given under "Wheat in the United States" and select your facts.

Let us again suppose that you desire information on this problem: How do the cities situated on the Great Lakes get pure water? There are several possible headings under which you might look; for instance, *Great Lakes*, *Lakes*, *Water*, *Water Supply*, etc. You find nothing helpful until you open the drawer marked "W," looking for "Water Supply," and find this card:

628 Water Supply
H 331 Hazen, Allen 1869

Clean water and how to get it, by Allen Hazen. 1st ed. New York, J. Wiley & Sons (etc., 1907).

Consulting the table of contents or the index, you find a chapter heading, "Supplies from the Great Lakes . . . . 29," which is just what you want.

You will need some practice before you can use the card catalogue easily; but the librarian will gladly give you assistance when you need it.

2. The North Central States

State	Area in Square Miles	Population (1920)	Largest City	Population (1920)
Illinois	56,700	6,485,000	Chicago	2,702,000
Indiana	36,400	2,930,000	Indianapolis	314,000
Iowa	56,100	2,404,000	Des Moines	126,000
Kansas	82,200	1,769,000	Kansas City	101,000
Michigan	58,000	3,668,000	Detroit	994,000
Minnesota	84,700	2,387,000	Minneapolis	381,000
Missouri	69,400	3,404,000	St. Louis	773,000
Nebraska	77,500	1,296,000	Omaha	193,000
North Dakota	70,600	646,000	Fargo	22,000
Ohio	41,000	5,759,000	Cleveland	797,000
South Dakota	77,600	637,000	Sioux Falls	25,000
Wisconsin	56,100	2,632,000	Milwaukee	457,000

Questions. — 1. Find the average area of the states in this group. 2. How does this compare with the average for the Northeastern States? 3. What explanation can you suggest for the difference in size of the states in different sections of the country (Fig. 11)?

Distribution of population in these states. — Fig. 62 reminds one of the population map of the Northeastern States (Fig. 21) in the number of large centers of population. Of the twenty-five largest cities in the United States, ten are found in those states, while here there are nine. See if you can name the cities represented by the largest groups of dots. Since each dot stands for 10,000 population, you can tell which group of states has, on the whole, the larger cities. Which is it?

There is one very marked difference in the distribution of the people in the two sections. Many areas in the Northeastern States contain very few people; while in this group of states the population outside of the great cities is rather dense and evenly distributed, becoming gradually more sparse toward the west. Show that this is true. This suggests that the farm lands here are much more attractive than those of the other section. Let us see what their attractions are.

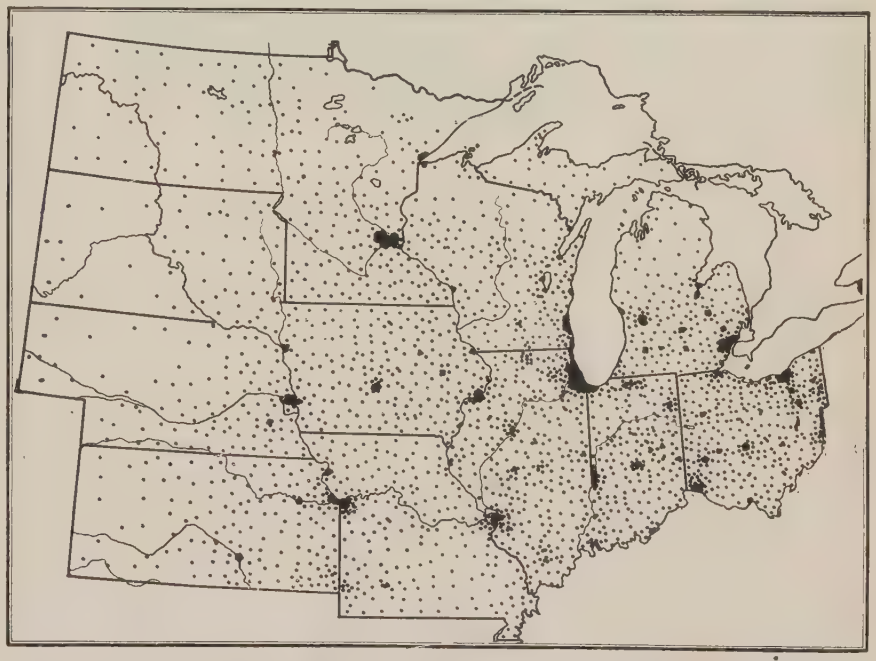


Fig. 62. — Distribution of population in the North Central States
Each dot represents 10,000 people.

Comparison of these states with the Northeastern group in agricultural possibilities. — One disadvantage for agriculture stands out plainly in Fig. 18. As is explained on p. 237, the principal source of rain for this vast area is the Gulf of Mexico, and the eastern states in the group receive an abundant supply. Note the amount. Toward the west, however, the amount decreases, and west of a certain line the fall is less than twenty inches, which is too little for ordinary agriculture. Which states suffer in this manner? Note how close this line is to the one-hundredth meridian. The reasons for this lack of rain are stated on p. 131.

One disadvantage

In the Northeastern States there are many mountains, and the surface in other portions was left very uneven and strewn with bowlders by the Great Ice Sheet. This section does not share these disadvantages. The Black Hills are the chief mountainous area,

The great advantage in the character of the surface

Fig. 63. — Land regions of the North Central States

Cross lines indicate lake plains. "Plains of glacial deposition" are plains on which the Glacier, or Ice Sheet, *deposited* material which it had removed from districts farther north. Point out the two "unglaciated areas" where there is no evidence of action of the Ice Sheet.

and these are not extensive. Locate them. While Fig. 63 shows that a very large part of the land was covered by the Ice Sheet, it left much of the surface surprisingly level and free from rocks. Only in the neighborhood of the Great Lakes are there many lakes and swamps (Fig. 77). Which states have the most lakes? Most of the land that was not reached by the ice is also very level.

In one respect the Ice Sheet did great service to the farmers. For, while it scraped off so much of the surface in the area just south of Lake Superior that the soil is very thin there (Fig. 63), elsewhere it added to the soil much finely ground rock gathered from many places in its path and made a mixed soil of great fertility. Since the Ice Age, large quantities of plant remains have also become mixed with it, making it especially rich and giving it a dark color; in some parts of Illinois and Iowa the soil is almost black.

The advantage due to a more continental climate

Being a long way from the ocean, these states have a more *continental* climate than the Northeastern group. This means that they become hotter in summer and colder in winter, which gives them a very important advantage. In what two temperature belts do these states lie (Fig. 12)? They can raise all the crops that flourish in the Northeastern States, and, owing to the hotter summers, can grow others besides. For example, it is difficult for corn to mature there; but here it is one of the leading products.

From The Geography of the World's Agriculture (1910)

Fig. 64

Locate each of the three most important wheat regions. What kind of wheat is produced in each? What is the rainfall in each?

Why these states may be called the granary of the United States. — Fig. 64 makes clear one reason why these states are sometimes called the granary of the United States. Which states take the lead in wheat raising? Which others raise a large amount? The United States is one of the chief wheat-producing countries of the world, growing from 600,000,000 to 1,000,000,000 bushels per year; and more than two thirds of the whole amount comes from these states. See how long a list you can make of the uses of wheat.

Courtesy of U. S. Dept. of Agric.

Fig. 65. — Husking corn from the standing stalks, Iowa

The corn stalks on some farms are cut and shocked in the fall and husked later from the shock. The stalks are fed to the cattle. The easier method is to husk the corn in the field and then turn the cattle into the field to eat the stalks.

Fig. 70 shows the *Corn Belt*, stretching from western Ohio to central Kansas and Nebraska, in which about one third of all the cultivated land is in corn. Name the states in the Corn Belt. What are the half dozen that grow the greatest amount? Note how much more is produced here than in the Northeastern States.

The United States is by far the leading country of the world in the production of corn, growing about 3,000,000,000 bushels per year; and about two thirds of our entire crop comes from these states. What uses of corn can you list?

In addition, these states lead in the production of oats. Three other crops, rye, barley, and flax, are grown more extensively here than in all our other states together.

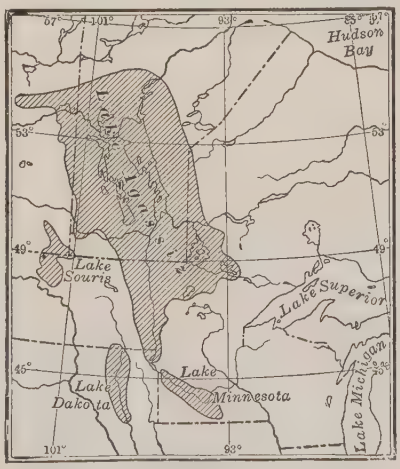


Fig. 66. — Ancient lakes in the wheat region

The traveler in this region in early summer sees luxuriant fields of grain on every hand. A cornfield usually presents the most beautiful appearance in July, when the corn tassels out. The plants as seen from a distance then entirely hide the ground from view, and the rich green stalks, with their long, slender leaves, bend to the breezes in the most graceful manner. The waving fields of wheat and oats, rich in color as they ripen, are hardly less beautiful.

Some of the reasons for the location of the wheat areas. — In Fig. 64 it is plain that the most important wheat area is in North and South Dakota and Minnesota. *Spring wheat* is cultivated there, so called because it is planted in the spring. It flourishes best in a comparatively cool climate where the rainfall is not

great; and these states meet such conditions very fully.

In addition, they have a soil that can hardly be surpassed in fertility. One of the reasons for its excellence dates back to the time when the Great Ice Sheet was melting away. The ice then stretched across the valley of the Red River, which now flows northward into Canada. On account of the ice dam, this river was forced to seek an outlet to the south, instead of flowing north, and a vast lake, known to geologists as Lake Agassiz (Fig. 66), was thus formed. When the ice melted away from the valley, the river once more flowed northward and the great lake disappeared. The soil of the wheat region is the sediment that was deposited on the bottom of this ancient lake.

Courtesy of International Harvester Co.

Fig. 67. — Threshing in the North Central States

The machine near the middle of the picture is a separator, so called because it separates the grain from the straw. The men on the stack at the left pitch bundles into the separator. The grain is collected in bags on the right of the machine and the straw is blown out of the separator into a stack. This separator is being run by a gasoline tractor.

The land here is almost as level as a floor; so level, in fact, that after a rain the water stands in sheets on the fields. It is necessary to elevate the roads a foot or more and make ditches on either side; otherwise the roads would often be impassable. In every direction there is nothing to break the view, and one can plainly see the farmhouses with a few trees around them ten miles, or more, distant. One can ride through this region all day long on the train and see scarcely a single crop besides wheat.

The wheat area next in importance to this one is Kansas and Nebraska. There *winter wheat* is grown; this is planted in the autumn instead of in the spring. In states so far north as the Dakotas it is likely to be killed by the severe cold, but here it flourishes.

Conditions that first confronted the farmer

The story of a typical wheat farm in Kansas. — Let us study in some detail the experiences of the owner of a certain prairie farm in central Kansas. His farm has an altitude of 2,000 feet, and lies on the western edge of the Wheat Belt, where the rainfall is just about twenty inches. The altitude and rainfall permit wheat raising, but make it rather an uncertain crop. The soil, however, is fertile and there is no difficulty in raising a large crop if the rain does not fail. The farm is level and easily worked. These were the conditions as he found them.

Some of his difficulties

At first his chief difficulty was lack of experience. In that dry country he attempted to raise crops just as he had raised them in the well watered country from which he had come. He had to learn, after many failures, that it was necessary to save moisture by special meth-

ods of cultivation, somewhat similar to those described on p. 144 in the case of *dry farming* in the West.

When this farmer went West he took his seed wheat, which was adapted to a much damper climate. It could not thrive in the dry climate of these plains. Then some emigrants from southern Russia arrived, bringing wheat that had grown in the semi-arid climate of that country. It could stand drought in summer and cold in winter. Our farmer learned of this and secured Russian wheat for seed, with good results.

Other difficulties arose. The millers at first had no machinery for grinding hard wheat. Then, when they had changed their milling processes and were able to make wheat into flour, our farmer found that his wife did not know how to bake with the new kind of flour. It was really one of the very best kinds, because it contained a great deal of *gluten*, or nourishing substance; but it required practice before she learned how to use it.

Some years he had a good crop, but could not sell it for enough to pay expenses. Other years the weather was dry and he had no crop at all. Some years the crops were destroyed by grasshoppers and chinch bugs; and some years he sold large crops at a good profit.

Courtesy of U. S. Dept. of Agric.

Fig. 68. — A farm in the western part of Kansas

The stacks of hay in the foreground have been taken from the surrounding fields. Corn is seen growing just beyond. Both corn and hay are raised on the level ground. The broken, hilly land in the background is used for pasture, while the trees along the stream furnish shelter for the live stock. This is in the Great Plains, where there are few trees except along the streams. How many farmhouses can you see? What is the rainfall in this part of the United States (Fig. 18)?

All this time he and his family were working with might and main. They kept cows and sold butter in the neighboring village. They had pasture land and kept beef cattle to sell in the fall. They raised garden vegetables and watered them in dry weather from the well.

How the family worked, and the outcome of their struggles

After a time conditions began to improve. The wheat sold at a higher price, and other farm products kept pace with it. Little by little the secrets of soil, seed, cultivation, and climate were learned. The children grew up and worked in the fields. Finally enough money had been saved to buy more land. This farm now contains several thousand acres; after thirty-five years of labor its owner has retired from active work, and his sons and sons-in-law have taken over the farm management. When you know his story, you know that of many hard-working, persevering, intelligent men of the Wheat Belt, who have made good homes on land that was once considered fit only for grazing.

They raise other grains on the farms now, but wheat is still the chief crop. If possible, the men begin to plow in July and continue through August. On the farms are many horses, but the plowing is done mostly by steam or gasoline tractors. Each engine

Getting the crop well started

pulls from three to ten plows and can do the work of many horses. The harrowing is done as soon as possible after plowing, to prevent escape of moisture. This is done mainly with horses.

When the weather and other conditions are favorable, the seeding is done in late September and early October. For this purpose wheeled drills are used, which deposit the seeds in rows about six inches apart. From twelve to sixteen rows are planted at a time. A drill is usually drawn by three horses.

Courtesy of International Harvester Co.

Fig. 69. — A binder at work

If the weather is good the little plants come up quickly and within ten days can be seen across the fields. Before cold weather comes the fields are green. Sometimes the winters are dry and cold. The wheat then withers, the fields look brown, and fierce winds are likely to blow the dirt away from the roots. After such a winter the spring sometimes opens with terrible dust storms, strong winds gathering the fine soil from the fields and carrying it away in clouds that darken the sky. It lodges in drifts by fences and hedges, and sometimes not a trace of wheat is left in the fields. Then there is nothing to do but to plant the land in spring crops, such as oats, barley, or sorghum.

Let us suppose that the wheat has "come through the winter well," as the crop bulletins express it. By March it should be strong and green. When it fully covers the ground, there is no longer danger from high winds because the dust cannot then be raised so easily. If rain is plentiful, the wheat grows rapidly and by the last of May is two to three feet high.

Dangers shortly before harvest

The month of June is critical. The grains are forming then, and if the weather is too dry and hot they shrivel and become inferior. A sudden dry spell with hot winds just as the grain is ripening will in a few days destroy the prospects for a bumper crop. If there is too much rain, the straw becomes too luxuriant, and there is little grain.

Let us suppose again that the wheat has come through all the trials of cold weather, high winds, spring drought, and early summer heat and rain, and that the crop is ready for harvest. That begins from the tenth to the twentieth of June, and is usually over by the tenth of July. In twelve to twenty days the farmers gather in the results of the year's work. The harvesting may be done with machines called *headers*, so named because they cut off the heads of the grain, leaving the stems or straws standing; several wagons may be necessary to haul to the stack the heads cut by one header, or *binders* may be used, which both cut and bind the grain.

Method of harvesting

No farmer has help enough on his farm to do the work of harvest in good crop years. On that account men from outside the Wheat Belt are brought in, great numbers of them and all kinds — college boys, factory hands, and even tramps.

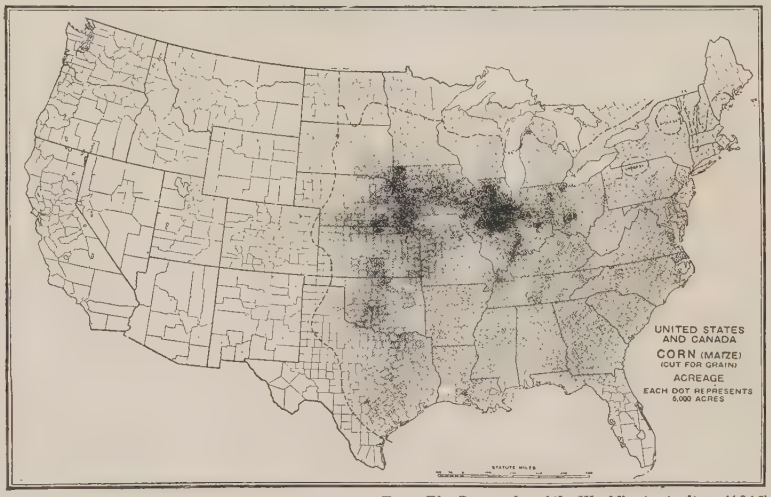
Early in July the wheat should all be in the stack; then threshing takes place. Many farmers have their own threshing outfits. Others have the threshing done by contract. The owner of an outfit comes to the farm with his equipment and his help and delivers the threshed grain at a certain price per bushel. He usually has a traction engine, a *separator*, a water wagon, and a "cook shack." The separator threshes out the grain at the rate of 1,000 or even 2,000 bushels per day. On some of the largest wheat farms, however, the modern *combined harvester* is used, which cuts, threshes, and sacks the grain as it moves across the field.

Method of threshing and marketing

The wheat, instead of being sacked, is often hauled to market in light wagon boxes, each holding about fifty bushels. When the load comes to the grain elevator at the country station, it is weighed. Then it goes to a dump where the front of the wagon is elevated until the wheat runs out of the box into a pit underneath. From there it is elevated by machinery into the high bins of the building; and thence it is later run through spouts into freight cars standing on the tracks beside the elevator.

Prosperous farmers have storage capacity on their farms for a large part of their crop, if they wish to hold the wheat until the price is better. On many farms it is stored in sheet-iron structures resembling water tanks. These stand on a foundation of wood or concrete and must be proof against moisture and vermin. Many farmers have a large amount of wheat on hand most of the time, and, of course, the price of wheat is closely watched from day to day.

Reasons for the location of the Corn Belt.—While Fig. 70 shows that corn is widely cultivated in the United States, very little is grown in the extreme northern and western portions of this section. The land here is very level, like that farther east, but it is much higher; there is, in fact, an upward slope all the way from the Mississippi River to the foot of the Rocky Mountains. The



From The Geography of the World's Agriculture (1910)

Fig. 70

products of this elevated, semi-arid area just east of the Rockies, which is called the *Great Plains* (Fig. 63), are quite different from those east of the one-hundredth meridian. The nights are too cold for corn because of the high altitude and latitude. Lack of rain in this region is another barrier to its cultivation (Fig. 18).

Corn requires a frostless season of not less than 140 days, and at least thirty inches of rain. It grows most rapidly during hot, "muggy" spells, and matures best where the cool days and nights of autumn check the growth of stalk and leaves and thereby aid

in the ripening of the grain. All these conditions are especially well met in the Corn Belt. What brings the much needed rain is discussed on p. 237.

Courtesy of U. S. Dept. of Agric.

Fig. 71. — A sugar-beet digger at work

Machines have been made for nearly every kind of work on our farms. This machine is run by a gasoline engine.

Use of farm machinery in these states. — In Ohio the farms average about 90 acres; in Illinois, about 130; in Iowa, about 150; in Nebraska, about 300; and in North Dakota, about 380. This is in striking contrast with the size of farms in Japan, which average about four acres in extent,—a fact which suggests that most of the work is done by hand. Without the aid of machinery, there would be no way to cultivate so much land. However, the level surface, the firm soil, and the nature of the crops all allow its free use, and an enormous number of machines is now found on these farms.

The need of machinery in the cultivation of large farms

Where formerly a spade or a single plow might have been used for stirring the soil, *gang plows* are now common. A gang plow is nothing more than a group of several plows drawn by horses, or, oftener, by a steam or gasoline tractor. It is not uncommon to see a tractor drawing at one time a gang plow, a harrow to break up the clods and level the surface, and a seeder for planting the grain.

All this region might still be the pasture of the buffalo, if labor-saving machinery had not been invented. Thousands of years ago our ancestors in the Old World cut wheat with a hand sickle. A hundred years ago grain was still cut by hand, an improved implement called the *scythe and cradle* being in common use. The grain was threshed out by being beaten with clubs; it was then separated from the chaff by throwing both into the air and letting the wind carry the latter away.

These methods did not change until about eighty years ago. Then American inventors produced a horse-drawn *reaper*. With the hand sickle a quarter of an acre had been a good day's work; with the scythe and cradle, two acres; but with this machine a man could cut ten or twelve acres per day. The grain still had to be bound into sheaves by hand.

Some of the kinds of farm machinery, and their advantages

By the time the prairies were extensively cultivated for grain, the other harvesting machines were invented whose use we have already discussed. The result is that by the aid of horse power and machinery one man

Courtesy of U. S. Dept. of Agric.

Fig. 72. — A corn picker at work in Iowa

Corn is the chief crop in Iowa. Only by use of machinery could such a large quantity be raised on each farm. This machine removes the ear from the stalks, husks it, and drops it into the wagon box.

From The Geography of the World's Agriculture (1910)

Fig. 73

can easily do twenty times as much as could be done in the olden times. In fact a farmer can now probably raise a hundred acres of wheat as easily as the farmer of ancient times could raise one. The final advantage is that a hundred persons can now have white bread where formerly there was only enough for one.

Machines are now used for harvesting corn, for loading hay and storing it in barns, for spreading fertilizer, and for a great number of other purposes. Without the aid of machinery the North Central States would produce only a very small part of their present crops.

Contribution of these states to our meat supply. — Meat is almost as necessary a food as flour. Let us see the extent to which these states produce it. Fig. 73 shows the distribution of beef cattle. Which of these states are most prominent in cattle raising? In Fig. 230 the leadership of this section in production of pork is shown to be even more striking. Note the states that have the largest number of swine. Poultry, also, because of its double value for meat and for eggs, is an important product.

Corn and other grains are the chief food of cattle, hogs, and poultry. The cattle eat not only the grain, but the stalk of the corn as well. If it is to be used as fodder in winter, it is cut before frost, when the kernels on the cob are still somewhat soft and milky. If it is to be used for winter feed, it is likewise cut early, chopped up, and stored in the silo; it is then called *ensilage*. Corn is so valuable for fattening that many cattle raised on the Great Plains are sent to the corn states to be fattened before being marketed. The states of the Corn Belt are also prominent in the production of hay and other food for cattle.

These facts largely explain why the North

Fig. 74. — Kafir corn in Kansas

Kafir corn is a sorghum grown for its seed and for fodder in the regions of little rain. For other crops grown in such regions see p. 144.

Central States supply most of our meat, and in particular why this meat comes mainly from the Corn Belt.

The prominence of dairying, and reasons for its development. — How do these states compare with the Northeastern group in dairying? Fig. 231 answers that question, so far as the value of dairy products put on the market is concerned. What is the answer?

By comparing Fig. 70 with Fig. 231, you find that dairying is most prominent a little to the north of the Corn Belt. What large cities must help to determine this location? The cool summers there also favor the dairy industry. In spite of the importance of dairying in New York (p. 55), Minnesota and Wisconsin have more creameries than any other two states, and the Elgin market in northern Illinois has long fixed the price of butter for most of our country.

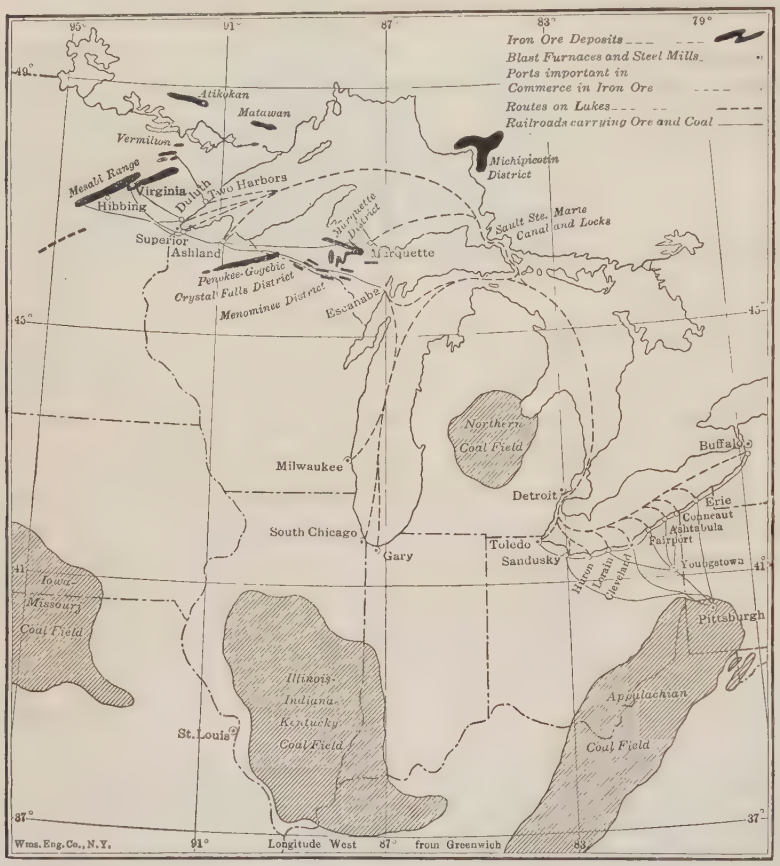


Fig. 75. — Iron ore and coal in the North Central States and near-by sections

Trace the route of a ton of iron ore from the Mesabi Range to Pittsburgh; to Gary. What upper lake ports ship iron ore? What lower lake ports receive the ore? Name the regions producing iron ore. From where does Gary receive most of its coal? What are the advantages for iron and steel making at Duluth?

Prominence of manufacturing. — Since the North Central States are the granary of our country and supply a large share of our meat and dairy products, one might conclude that most of the people were farmers. Yet only about half the population live on farms; and it should be remembered that out of the twenty-five largest cities in the United States, nine are located in this section (p. 481).

As manufacturing is one of the principal explanations for the gathering of many people in cities, a large amount of it must be done here. In fact, these states rank next to the Northeastern group in that industry, producing about four fifths as many goods in value.

How the supply of power favors manufacturing. — Gas and oil are found in Ohio and Indiana, but the supply has greatly decreased in recent years. Water power is by no means so abundant as in the Northeastern States, because most of the land is comparatively level. Yet such power is available in many places. One of the greatest power dams in

the world is located across the Mississippi River at Keokuk, about 150 miles north of St. Louis. The dam is about one mile in length, and the electric power produced is nearly one half that produced at Niagara Falls (p. 34). It is transmitted to many towns in Iowa, Illinois, and Missouri, and a large part of it is used for driving street cars and machinery in St. Louis.

The chief source of power for manufacturing, however, is soft coal, of which there is an abundance. Fig. 75 shows how well it is distributed. Which states are best supplied? Which states are so far from it that their industries are likely to suffer? Name several cities in these states that are very near coal beds. Estimate some of the distances.

How means of transportation favor manufacturing and commerce. — Easy and cheap means of transportation are always necessary for extensive manufacturing and trade. How well supplied is this region in this respect?

© *Ewing Galloway*

Fig. 76. — Where freight cars and lake vessels meet

These docks are at Cleveland. Lake Erie is seen in the background. Note also the breakwater and the opening in it to permit the passage of vessels into and out of the harbor which it forms.

Fig. 11 shows what an abundance of navigable waterways is furnished by the rivers. Name and locate the states most benefited by them. Before the opening of the old Erie Canal and the construction of railroads, large quantities of wheat, corn, and other products were floated down the Mississippi and its tributaries to New Orleans and then shipped to our eastern coast or abroad. These rivers were then far more important for transportation than the Great Lakes.

The early use of waterways

When, however, in 1825, the Erie Canal provided cheap transportation to the Atlantic coast, these rivers began to lose their lead. Then other canals were constructed, connecting the rivers in the state of Ohio with Lake Erie; and the Great Lakes route became more and more important, until the traffic upon it far surpassed that of the rivers.

Meanwhile railroad building began, the level surface making construction much cheaper here than in the Northeastern States. Fig. 233 shows the great extent of the railroads to-day. While the entire country has about 266,000 miles of railroad, these states alone have nearly 100,000, which is much more than their share. The most important roads run east and west, but many parallel the large rivers and haul goods that could easily be carried by water. For many years the rivers have been little used for transportation; and the railroads have even diverted considerable traffic from the lakes. Trans-

Extent to which railroads have taken the place of waterways

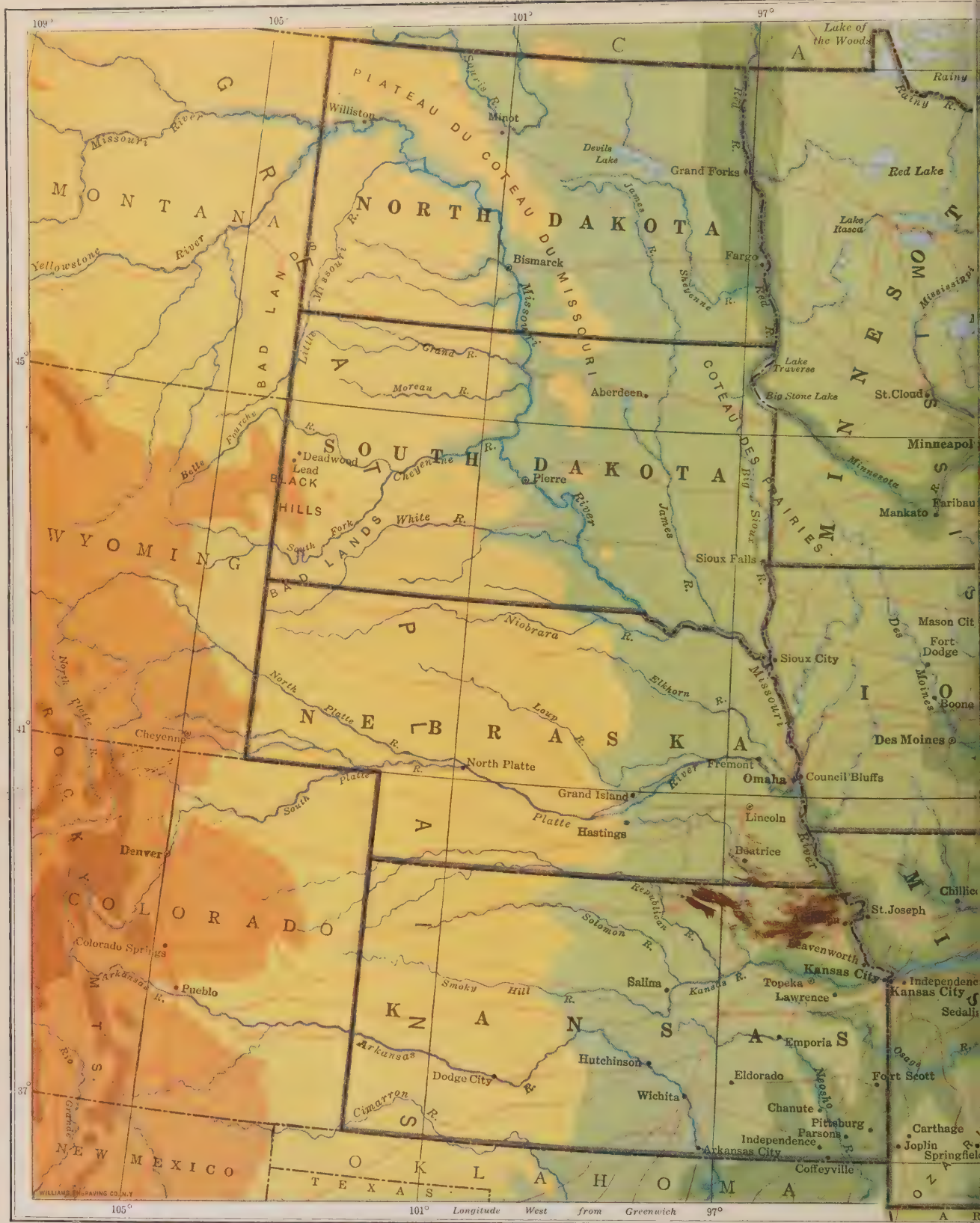

109°
105°
101°
97°
45°
41°
37°
Lake of the Woods
Rainy R.
Williston
Minot
Devils Lake
Grand Forks
Red Lake
Lake Itasca
Bismarck
Fargo
Lake Traverse
Big Stone Lake
St.Cloud
Minneapol
Aberdeen
Deadwood
Lead
Pierre
Faribau
Mankato
Sioux Falls
Mason Cit
Fort Dodge
Sioux City
Boone
Des Moines
Cheyenne
North Platte
Fremont
Omaha
Council Bluffs
Grand Island
Lincoln
Hastings
Beatrice
Denver
Chillic
St.Joseph
Colorado Springs
Pueblo
Leavenworth
Kansas City
Independence
Salina
Topeka
Lawrence
Sedalia
Emporia
Hutchinson
Eldorado
Fort Scott
Dodge City
Wichita
Chanute
Pittsburg
Parsons
Carthage
Joplin
Springfiel
Independence
Arkansas City
Coffeyville
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
COLORADO
KANSAS
OKLAHOMA
TEXAS
NEW MEXICO
MINNESOTA
IOWA
MISSOURI
PLATEAU DU COTEAU DU MISSOURI
BAD LANDS
BLACK HILLS
COTEAU DES PRAIRIES
ROCKY MOUNTAINS
Missouri River
Yellowstone River
Little Missouri R.
Grand R.
Moreau R.
Belle Fourche R.
Cheyenne R.
South Fork White R.
James R.
Big Sioux R.
Niobrara R.
North Platte R.
Loup R.
Elkhorn R.
Missouri R.
Des Moines R.
South Platte R.
Platte River
Republican R.
Solomon R.
Smoky Hill R.
Kansas R.
Arkansas R.
Cimarron R.
Neosho R.
Osage R.
Red R.
Minnesota R.
Mississippi R.
Longitude West from Greenwich
WILLIAMS ENGRAVING CO. N.Y.

Fig. 77

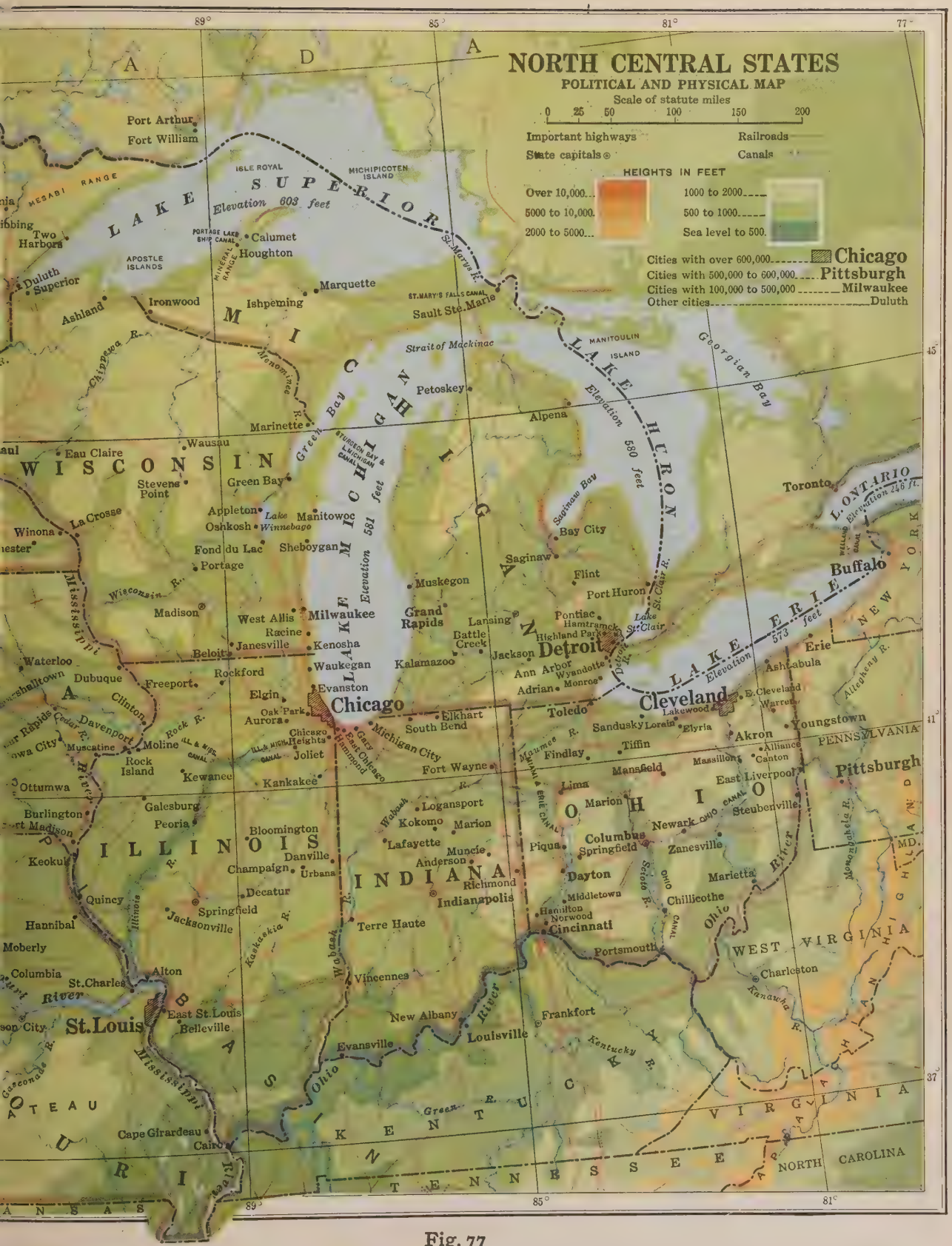

NORTH CENTRAL STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 25 50 100 150 200
Important highways
State capitals
Railroads
Canals
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Cities with over 600,000 Chicago
Cities with 500,000 to 600,000 Pittsburgh
Cities with 100,000 to 500,000 Milwaukee
Other cities Duluth
LAKE SUPERIOR
Elevation 603 feet
LAKE MICHIGAN
Elevation 581 feet
LAKE HURON
Elevation 580 feet
LAKE ERIE
Elevation 573 feet
LAKE ONTARIO
Elevation 246 ft.
Port Arthur
Fort William
Isle Royal
Michipicoten Island
Mesabi Range
Two Harbors
Duluth
Superior
Apostle Islands
Portage Lake Ship Canal
Calumet
Houghton
Marquette
Ishpeming
Ironwood
Ashland
Mineral Range
St. Mary's River
St. Mary's Falls Canal
Sault Ste. Marie
Manitoulin Island
Strait of Mackinac
Georgian Bay
Petoskey
Alpena
Marinette
Menominee R.
Chippewa R.
Green Bay
Wausau
Eau Claire
WISCONSIN
Stevens Point
Green Bay
Appleton
Lake Winnebago
Manitowoc
Oshkosh
Fond du Lac
Sheboygan
Portage
La Crosse
Winona
Wisconsin R.
Mississippi R.
Madison
West Allis
Milwaukee
Racine
Janesville
Kenosha
Beloit
Waterloo
Dubuque
Freeport
Rockford
Waukegan
Evanston
Elgin
Oak Park
Chicago
Chicago Heights
Joliet
Aurora
Clinton
Davenport
Rock R.
Cedar R.
Iowa City
Muscatine
Moline
Rock Island
Ill. & Mich. Canal
Ill. & Miss. Canal
Kewanee
Kankakee
Ottumwa
Burlington
Galesburg
Peoria
Bloomington
Danville
Champaign
Urbana
Keokuk
Illinois R.
ILLINOIS
Decatur
Springfield
Jacksonville
Quincy
Hannibal
Moberly
Columbia
St. Charles
Alton
St. Louis
East St. Louis
Belleville
Missouri R.
Missouri River
Kaskaskia R.
Wabash R.
Terre Haute
Vincennes
INDIANA
Richmond
Indianapolis
Lafayette
Muncie
Anderson
Logansport
Kokomo
Marion
Wabash
Michigan City
South Bend
Elkhart
Gary
East Chicago
Hammond
Calumet R.
Fort Wayne
Kalamazoo
Battle Creek
Grand Rapids
Muskegon
Lansing
Jackson
Ann Arbor
Detroit
Pontiac
Hamtramck
Highland Park
Lake St. Clair
Detroit R.
St. Clair R.
Saginaw Bay
Saginaw
Bay City
Flint
Port Huron
Toronto
Buffalo
Welland Canal
Niagara R.
NEW YORK
Erie
Ashtabula
Cleveland
E. Cleveland
Lakewood
Warren
Youngstown
Akron
Alliance
Canton
Massillon
Sandusky
Lorain
Elyria
Toledo
Findlay
Tiffin
Fremont
Miami & Erie Canal
Maumee R.
Mansfield
Lima
Marion
Newark
Columbus
Springfield
Piqua
Zanesville
Steubenville
East Liverpool
Pittsburgh
PENNSYLVANIA
OHIO
Ohio River
Scioto R.
Scioto
Dayton
Middletown
Hamilton
Norwood
Cincinnati
Chillicothe
Marietta
Monongahela R.
MD.
Portsmouth
WEST VIRGINIA
Charleston
Kanawha R.
Ohio
Louisville
Frankfort
New Albany
Evansville
Kentucky R.
Green R.
Cape Girardeau
Cairo
KENTUCKY
TENNESSEE
VIRGINIA
NORTH CAROLINA
Appalachian Highlands
Allegheny R.
Ozark Plateau
Kansas
89°
85°
81°
77°
45°
41°
37°

Fig. 77

Questions on Fig. 77. — 1. Why do the canals in Ohio follow the dark-green areas? 2. Which cities appear to you to owe their importance partly to the fact that they are railroad centers? 3. What states or portions of states that appear on this map are outside the limits of the North Central States (Fig. 19)? 4. If you wish to look up smaller places than are shown here, consult Fig. 499 or 501.

portation on the Great Lakes is largely confined to the shipment of heavy and bulky articles like iron ore, grain, lumber, and coal. River on both sides. What important lake ports are directly reached from this city by rail (Fig. 77)?

While there are no coal mines in this vicinity (Fig. 75), the Falls of St. Anthony in the Mississippi River supply a great quantity of power to Minneapolis and St. Paul (often referred to as the *Twin Cities*). This fact, together with the abundance of wheat, has favored the manufacture of flour.

Influence of wheat on manufacturing in Minneapolis

© Detroit Publishing Co.

Fig. 78. — The flour-milling district, Minneapolis

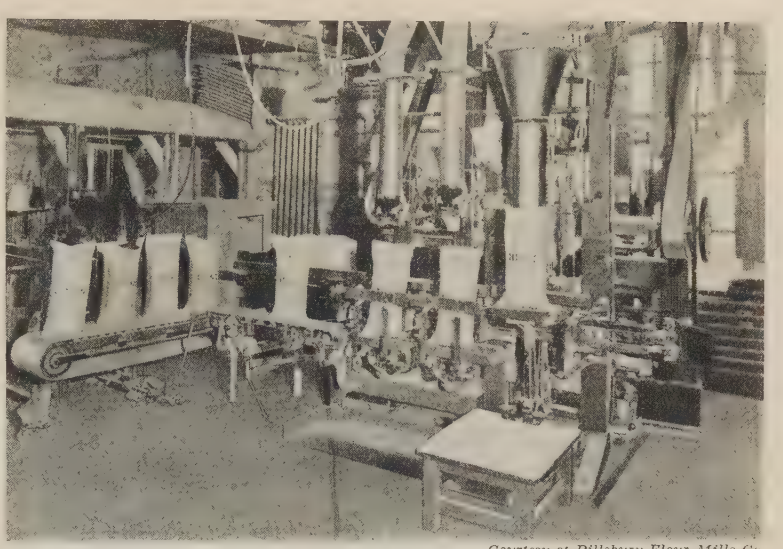
Influence of agriculture on the "Twin Cities." — Minneapolis is the greatest wheat market in the world, being on the eastern edge of the wheat section. Most of the grain goes East or Southeast. It has about fifty elevators averaging a capacity of nearly 1,000,000 bushels each. Fig. 77 shows what a great rail center this locality is, the railroads even paralleling the Mississippi

Influence of wheat on the commerce of Minneapolis

Business men have made full use of this advantage, for they have introduced machinery that has revolutionized the whole milling process. The Bible speaks of two women sitting at a mill, which calls up a picture that can still be seen in backward parts of the world. The mill consists of a lower millstone resting upon the ground, with a spindle in the center extending up through

1. Former milling processes

the center of another stone resting on the first. The upper stone has a handle by which one of the women turns it on the lower, while the other woman drops the grain in handfuls through the opening around the spindle. It falls down and is ground between "the upper and the nether millstone." The crushed grain is then gathered up and sifted, so that the husk or *bran* is separated from the white interior of the grain. The product is a very coarse kind of flour.



Courtesy of Pillsbury Flour Mills Co.

Fig. 79. — Filling cloth sacks with flour at one of the great flour mills in Minneapolis

The flour is weighed automatically and is then dropped through the large pipes into the sacks. These are moved along and pass by sewing machines which sew them up ready for shipment. Such machines as these increase production and save money to the consumers.

The flour eaten by our grandparents was only a little better. It was made in a crude little building beside some stream, called a *grist mill;* the power used was a creaking water wheel that turned very lazily. The farmer boy carried the grain in a bag, horseback, to the mill, and loitered about while the miller ground the grist. The miller had no particular skill, the wheat was poorly cleaned, and the mill was exposed to the dust. He ground the grain, however, sifted out the flour, took a portion as toll for his work, and put the remainder back into the sack. Then the boy took it home for the family bread.

Only about fifty years ago the process of roller milling was invented, and flour became a very different article.

2. The modern process

Modern milling machinery cleans the grain by removing all dust, seeds of weeds, and other foreign particles of every sort, and even the grains of wheat that are too light. The grains are so cleansed and scoured that when they go to the rollers to be ground they shine like gold.

The first set of rollers between which they pass barely cracks the grains; the next breaks them a little finer; and as they pass on each set breaks them a little more, until they are crushed into the finest flour.

In the meantime the bran has been removed, and the different grades of wheat have been separated from one another by machinery. The finished product is then sacked, even the bags being sewed up by machinery. All this time skilled workmen have been watching every process, yet no one of them has touched the flour with his hands. Such care in the manufacture of flour is a great protection to health; and so much labor and so much wheat substance are saved that these machines, like the improved farm implements, allow many persons to eat white bread where formerly only one could obtain it.

After the invention of the roller process Minneapolis soon took the lead in the manufacture of flour, and it is now the greatest center in the world for that industry.

Other manufactures of Minneapolis are breakfast foods made from grain; linseed oil, obtained from flax grown mainly in North Dakota and Minnesota; and agricultural implements that are required by the farmers in the neighboring states.

Influence of agriculture on other industries of St. Paul and Minneapolis

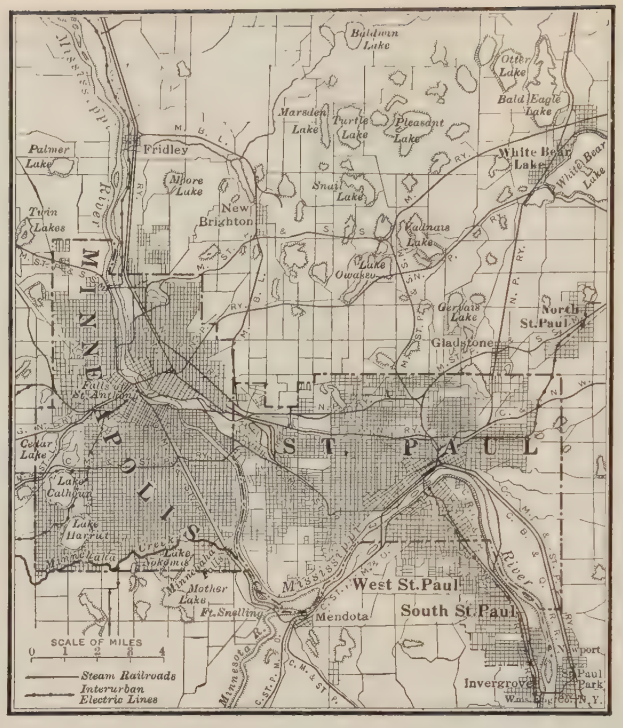


Fig. 80. — The Twin Cities

For an explanation of the number of lakes in this small area, see p. 10.

St. Paul, on the other hand, is distinguished as one of the leading horse markets of the country, horses being still in much demand on the farms; it is also one of the prominent markets for cattle, with extensive stockyards and packing houses. It manufactures shoes, machinery, and refrigerators as well as many other articles for the use of the farming population of the Northwest. It is also a leading publishing center.

Both cities are centers for the surrounding country, for wholesale trade supplying lumber and lumber products in enormous quantities, and clothing and many other manufactured articles from the East. In short, their two great occupations, manufacturing and commerce, are largely the result of the farm products and farm needs about them.

Influence of agriculture on other cities west of the Mississippi River. — Other cities west of the Mississippi River are dependent on the surrounding country in much the same degree. Everywhere there are cattle and hogs, as shown in Figs. 73 and 230, and the large cities are noted for their live stock and meat packing. Many sheep out of the vast number raised on the drier lands farther west (Fig. 166) are sent to the Twin Cities to be

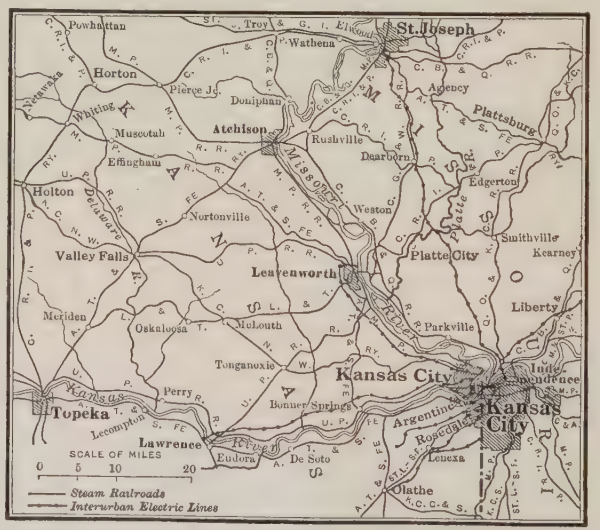


Fig. 81. — Kansas City and neighboring cities

In what two states does the area covered by this map lie (Fig. 77)?

slaughtered. Next to Chicago, Omaha, Kansas City, and St. Louis are the leading centers for live stock, although Sioux City in Iowa, St. Joseph in Missouri, and Wichita in Kansas each handles many thousands of animals per year. Locate these cities.

Practically every small town has a grain elevator, and the cities are centers for grain and milling. Kansas City and its namesake across the river in Kansas, being close to the winter-wheat section, are especially noted for grain and flour. All these cities resemble Minneapolis and St. Paul as trade centers for the surrounding country.

Why St. Louis is the largest of these cities. — The location of St. Louis on the Mississippi River near the mouth of the Missouri and also that of the Ohio places it in the center of a vast extent of waterways reaching northwest, northeast, and south. Trace these routes on the map. In the days before railroads this was a great advantage and gave the city a lead over all other points in this region. While the railroads now do most of the carrying, the rivers are still of some importance, and the city has retained its leadership.

It has extensive stockyards, as we have just noted, and large flour mills; it is also one of the great horse and mule markets of the world, and one of the leading markets for tobacco and wool. While it manufactures tobacco products extensively, its greatest manufacturing industry is that of shoes; and it is an important center for the distribution of dry goods, furniture, and hardware. Can you explain the reasons for extensive trade in these particular goods?

One important interest it has inherited. In the early days when it was connected by water with vast and little known regions where game was abundant, it became distinguished as a fur trading post. Although there is now little game near at hand, it is still a center for the collection of furs from every continent in the world.

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Fig. 82. — A portion of the stockyards at Kansas City, Missouri

Kansas City and Omaha are nearer the ranches of the Great Plains and semi-arid West than Chicago or St. Louis. They are therefore favorably situated for the slaughtering and packing industry.

The outcome of the former rivalry between Chicago and St. Louis, and the reasons for it. — For a long time there was much rivalry between St. Louis and Chicago to see which would outgrow the other. Now Chicago is three and a half times as large, and surpasses all other cities in the North Central States much as New York surpasses those in the Northeastern States. What has led to such remarkable growth?

There are three facts about its location that give Chicago a great advantage for trade in farm products. In the first place,

it is much nearer the center of this remarkably productive region than is St. Louis. The leading wheat region lies to the northwest, the Corn Belt is close at hand, and the dairy section is very near.

The superiority of the location of Chicago for trade in farm products

Second, the railroads connecting our northwestern states with the Northeastern group must pass around the southern end of Lake

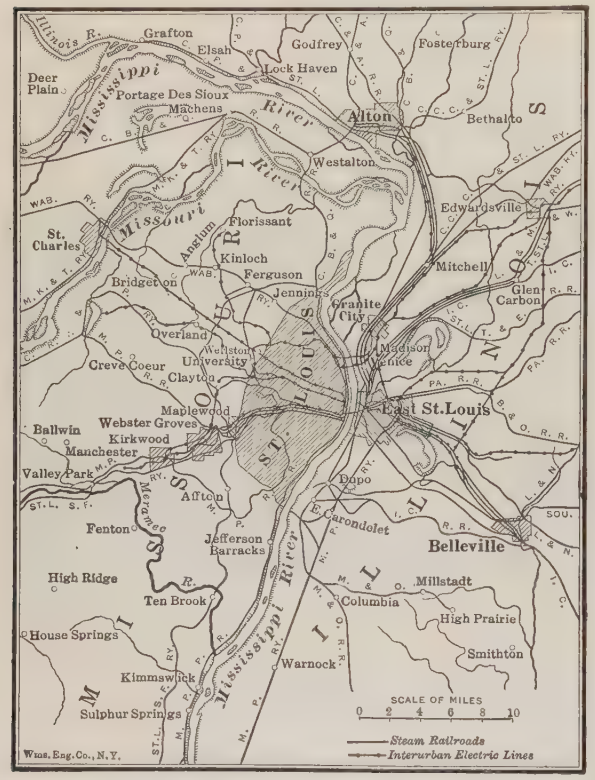

Fig. 83. — St. Louis and vicinity

How far distant is the mouth of the Ohio River (Fig. 77)?

Michigan. There is no route farther north that they can readily take. Also, goods bound for the East from districts west and southwest of Chicago can most easily go by way of the same city. Thus Chicago is a natural meeting place for routes connecting the East and the West and has become the greatest railroad center in the world. There are now more than thirty important railroads that have their terminals in that city. Yet no railroad passes through the city, though Pennsylvania Railroad trains pass directly through New York, a much larger city, on their way from Washington and Pittsburgh to Boston. How must this fact affect the handling of freight in Chicago?

With these advantages, it is not strange that Chicago has more trade in farm products than any of the other cities of this section. While Minneapolis is the greatest wheat market, Chicago is the greatest grain market, its trade in corn, oats, and other grains besides wheat being very extensive. It receives three times as much live stock as St. Louis, and sends forth more meat products than any other city in the world.

The Union Stockyards, where the cattle, sheep, and hogs are received and where the meat is packed, surpass anything else of the kind in the world. The yards and factories are so complete an organization that they resemble a city in themselves; and that section of Chicago has come to be known as Packingtown. It is worth a day's visit. Over 60,000 men are employed there, and the products have an annual value of nearly a billion dollars.

A day's happenings at the Union Stockyards

1. Extent of the yards

We might start the day by getting a bird's-eye view of the stockyards from the roof of one of the high buildings near by. One of the most impressive sights is the large number of railroad tracks and puffing engines. Twenty-five railroads deliver a total of 800 carloads of stock a day to these yards. If all the cars were in one train it would be nearly eight miles long. You will also see hundreds of pens or small yards containing the cattle, sheep, and hogs which have been unloaded from the cars. These are the stockyards; they occupy about 500 acres,

or an area nearly a mile square. The numerous buildings around the borders of the yards are the plants of the packers, where the animals are killed and dressed for market. You will also notice a network of runways or passageways leading from the pens to the various factories.

Fig. 84. — Lake vessels near the mouth of the Chicago River

Locate this river on Fig. 86. Two vessels are just coming in from across Lake Michigan. What freight do you think they bring over during the summer from southwestern Michigan? Trace the route vessels take in going between Chicago and Buffalo; between Chicago and Duluth.

2. The handling of the animals

Let us watch a carload of stock being unloaded into one of the pens. The unloading is sometimes difficult because the animals become frightened at the bustle and commotion. We shall find representatives of the packing companies on hand to look them over and arrange to buy them from the brokers or sellers. More than 50,000 head a day are thus bought in the Chicago yards.

Suppose we follow a group of hogs which have been purchased for one of the packing companies. We shall see them being driven along the runway leading to a packing house on the edge of the yards, and then up an inclined runway to the top of the building. After they have been given a shower bath and allowed to rest they are ready to be prepared for market. They are suspended from an overhead carrier by a chain and by it passed from man to man, being killed, scalded, scraped, and further prepared for the market, until finally a government inspector examines the meat to make sure that it is in good condition.

If the carcass is to be shipped whole, we find it next being sent to a refrigerating room to be cooled. If it is to be made into hams, bacon, and sausage at the factory, it passes along another line of men, each of whom has his allotted task of cutting and preparing the meat.

We have yet to see what becomes of the parts which cannot be used for meat, such

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Fig. 85. — A few of the large buildings in Chicago

These buildings face Lake Michigan: the street on which they are located is called Michigan Avenue. Grant Park is in the center. On the right, along the lake front, are the tracks of the Illinois Central Railway.

as the fat, blood, bones, skins, bristles, and hoofs. You will probably be surprised at the number of things that are made from them. The meat packers themselves manufacture some of these waste materials into what are called *by-products*. We shall see enormous vats where soap is being made from fats; great churns where oleomargarine is made from an extract of fat combined with milk and cream; and large kettles where lard is being made. What articles can you name that are made from the hides? Other by-products are fertilizer, bone handles, buttons, glue, oil, grease, candles, and medicines.

Fig. 86. — Chicago and vicinity

From the discussion in the text sum up all the reasons for the rapid growth of Chicago. The first settlement on the site of Chicago grew up around Fort Dearborn near the mouth of the Chicago River. How many miles long is the Chicago lake front?

The location of Chicago gives it a decided advantage over St. Louis for iron and steel manufacture. All the important cities of the North Central States are engaged to some extent in the manufacture of machinery or other iron and steel goods; but, as in the case of Pittsburgh, their iron ore must come from the Lake Superior district. Some of the richest iron mines in the world are located northwest of Duluth, about Virginia and Hibbing (Fig. 75), and there are others near Marquette in Michigan on the southern shore of Lake Superior. Also, in the peninsula northwest of Marquette, in the neighborhood of Calumet and Houghton, are very valuable copper mines. These mineral supplies, together with the coal of Pennsylvania, are, as we have seen, the key to the wonderful industrial development of the Northeastern States.

On the other hand, St. Louis is much nearer the important lead and zinc deposits of the North Central and the Southern States, which are mined extensively in Missouri, Arkansas, and Oklahoma (Fig. 153). What are some of the chief uses of these metals?

Superiority of the location of Chicago for the metal industry

1. Its nearness to the Lake Superior mineral district

Chicago is at least as well situated as Pittsburgh for utilizing the mineral deposits of the states bordering on the Great Lakes. Show in Fig. 75 its superiority over Pittsburgh in transportation of ore. How do the two compare in regard to coal supply? The superiority of Chicago over St. Louis for obtaining iron ore is clearly suggested in Fig. 75. State it as it appears to you. How do they compare in distance from coal? It is plain that the lake city easily surpasses the river city in advantages for metal manufacture. The extent of the industry is suggested by the fact that while Chicago has

2. How its location compares with that of Pittsburgh

3,000 vessels entering or leaving its harbor in a year, the largest item in its freight tonnage consists of iron ore.

While it makes an enormous quantity of machinery, it is noted for the manufacture of Pullman cars, and turns out more agricultural implements than any other place in the world. The conversion of iron ore into iron and steel takes place mainly at Gary and South Chicago, near the south end of Lake Michigan. Gary has about the same advantages as Chicago and is practically a part of the greater city. It is almost wholly occupied with iron manufacture, and is a leading center for the manufacture of steel for bridges and locomotives.

3. Its types of steel manufacture

The advantages of Chicago for collecting raw materials for manufacture count just as fully for their distribution in the form of finished products. The agricultural implements of the International Harvester Company are sold in largest quantities in the section of which Chicago is the center, but they are also distributed throughout the world; furniture and other articles made of wood are assembled in Chicago and distributed in all directions; clothing is extensively manufactured there, and sold to merchants in the surrounding states; and many goods from the Northeastern States are likewise distributed from that point. Can you state some reasons why several large mail-order houses have their central offices in Chicago? Finally, the city is the greatest center for lumber in the world.

Superiority of its location for general trade

The chief advantage of the lake cities over the river cities. — The proof that the lake cities have a decided advantage over the river cities is seen in the greater size of the former. Not only does Chicago far surpass St. Louis, the largest river city; but Detroit, Cleveland, and Milwaukee, all lake cities, are the next three in size, and are much larger than Cincinnati, Kansas City, and Minneapolis, which are not lake cities. Note the differences in the population of these two groups of cities (pp. 481 and 484).

Their difference in population

The lake cities have much the same opportunities as the river cities for the han-

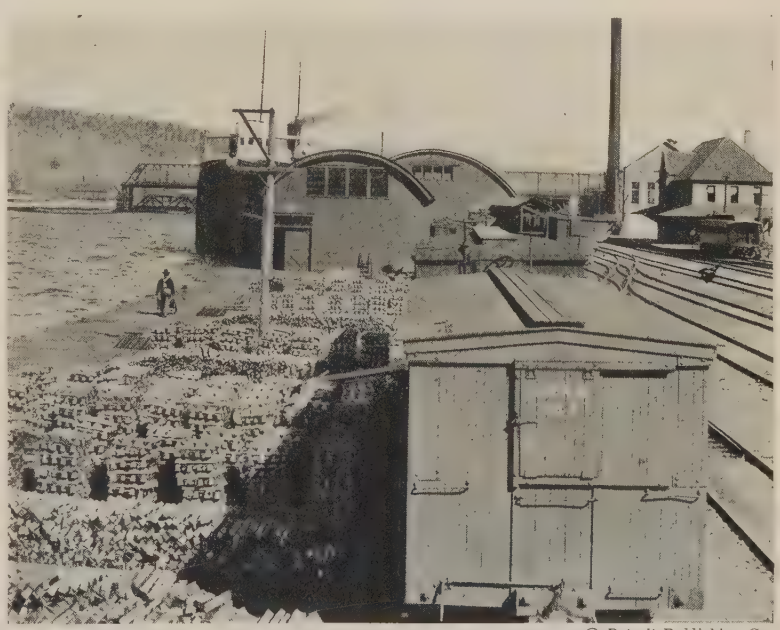

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Fig. 87. — Copper for shipment, Houghton, Michigan

Houghton is on a deep waterway in the heart of Keweenaw Peninsula. Locate it on Fig. 77. In the picture are shown copper bars piled up like wood. These will be shipped by boat to the lower lake ports and from there on to the great factories in the East. What are some of the uses of copper? Some of the mines in the Houghton region are more than a mile deep. This was once the most important copper region in the United States.

Fig. 88. — The Detroit River

An immense amount of lake shipping passes through the Detroit River. A lake vessel passes the

dling of farm products. Duluth, Superior, and Milwaukee, like Minneapolis, receive great quantities of grain for shipment east; they manufacture flour also. Milwaukee is noted for its meat packing, for its tanneries, and for the manufacture of shoes and many types of metal goods. Detroit is engaged to some extent in the milling of flour and in meat packing, while Cleveland is a market for grain and live stock.

Opportunities common to both

Fig. 75 suggests wherein the chief advantage of the lake cities lies. Tell the story that you see presented in that figure. At what points is the iron ore loaded? Where are the blast furnaces that convert this ore into iron and steel? Describe the routes that the ore must take in order to reach these furnaces.

The ease with which they can secure iron and coal

Pittsburgh, as you have seen (p. 32), is near the edge of the great Appalachian coal field. Since it is near the source of one of the two raw materials required in the manufacture of steel, it can well afford to transport the other from a distance.

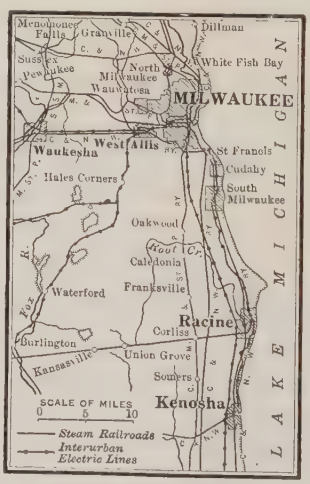

Fig. 89. — Milwaukee and vicinity

But trains and steamers that haul ore in one direction can well haul coal in the other. Name several cities on the southern shore of Lake Erie that might, on that account, be expected to engage in iron and steel manufacture. Cleveland, the largest of these, is noted for the manufacture of steel ships, wire, nails, and machinery of many kinds, and the others engage in similar industries. You see that blast furnaces are shown at Duluth (Fig. 75), although there are no coal mines within hundreds of miles to supply the necessary coal. The ore boats returning to Duluth furnish the explanation.

Detroit illustrates to a remarkable degree the effects of this advantage in the manufacture of automobiles. Attempts were made for 200 years to build "horseless carriages," but not until nearly 1900 were any really successful ones produced. With the introduction of the gasoline engine, however, the number of automobiles has increased from a few thousand in 1900 to over seven and a quarter million in 1919, of which over six million were in the United

How this advantage has affected Detroit

© Detroit Publishing Co.

and Detroit

city every ten or fifteen minutes on the average, day and night, during the entire season of navigation.

States. In 1919 nearly 1,900,000 pleasure cars and trucks were turned out in the United States alone.

The center of this industry is Detroit, more automobiles being manufactured there than in any other city in the world. Why is this the case? It is partly because carriage making was formerly carried on extensively in Michigan, Ohio, and Indiana. When the automobile began to displace the carriage, the manufacturers of carriages and wagons turned their attention to the construction of automobiles.

A second advantage that Detroit enjoys which encourages the manufacture of automobiles is the fact that its location on the Great Lakes waterway makes it easy to transport to that point the coal and iron and steel that are required in this industry. Much of the work connected with the manufacture of automobiles consists of the assembling of parts, such as engines, chassis, tires, and bodies made at different factories. Consequently, as large automobile factories have become established, the makers of such parts have built their factories near by so as to have a ready market for their output. By the addition of one factory after another engaged in some phase of automobile construction, Detroit has come to employ as many as 140,000 workmen in these factories alone. Its population increased in the ten years between 1910 and 1920 from 466,000 to 994,000.

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Fig. 90. — Giant hoists unloading an ore boat at Cleveland

Several hoists may work on the same boat at once, each lifting about seven tons of ore at a load, at the rate of a load a minute, With five hoists working on a boat, how long will it take to unload 1,400 tons of ore?

Influence of the Lake Superior minerals on other cities of Indiana and Ohio. — In almost any section of Indiana and Ohio one sees corn, oats, cattle, and hogs on the farms; and the same industries that are found in the towns and cities of Iowa and Kansas are common here. There are others, also, owing to the ease with which iron ore can be obtained from the Lake Superior district. For instance, Indianapolis is on no important water system, but owes its growth in large part to the prosperous farm lands about it. It is a center for grain, live stock, and meat. In addition, it ranks high in the manufacture of automobiles. Columbus, Ohio, is a grain center, but is also noted for the manufacture of machinery, steel cars, and other objects made of metal. Again, Cincinnati handles large quantities of live stock and meat products; but its leading industry is the manufacture of machinery and implements of many kinds for use in the mines, in the factories, and on the farms. In general, the nearer the cities are to the coal beds in eastern Ohio and Illinois and to the routes between these coal beds and the lake ports, the more prominent is their work in iron and steel.

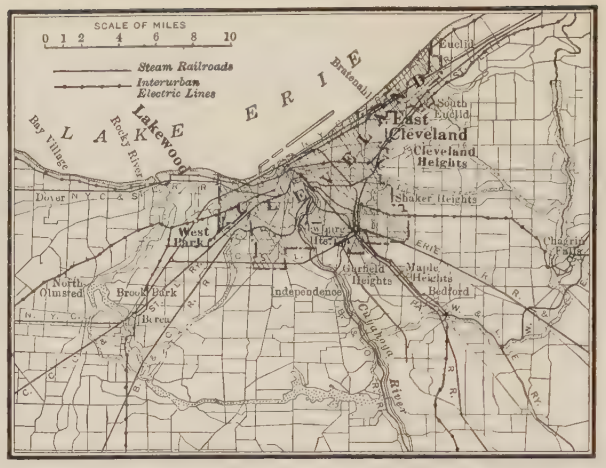


Fig. 91. — Cleveland and vicinity

Notice the elaborate system of parks and boulevards indicated by dotted areas.

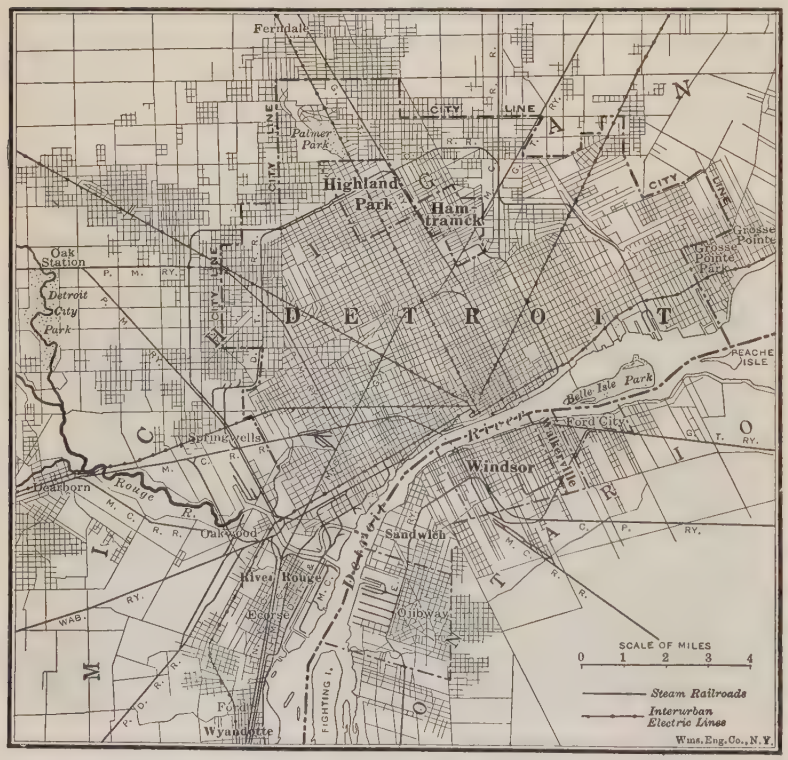
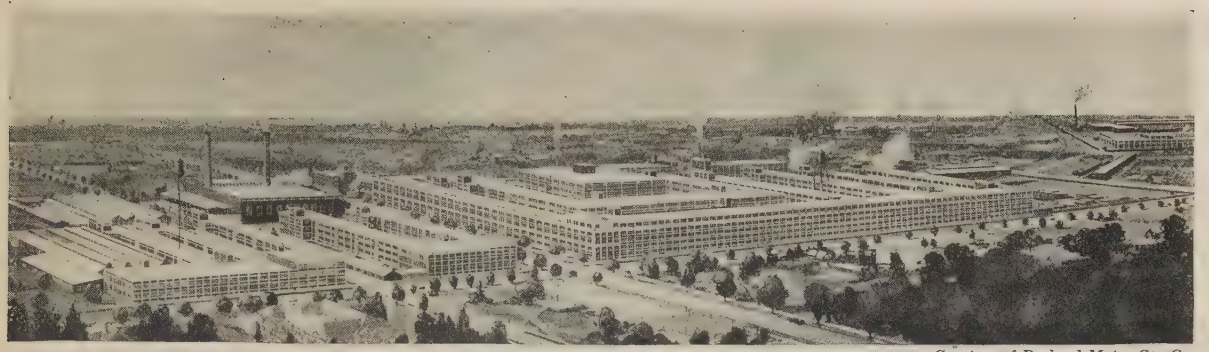


Fig. 92. — Detroit and vicinity

Highland Park and Hamtramck are separate cities, entirely surrounded by Detroit.

How one industry leads to another. — The farmer is employed in raising wheat; the wheat must be transported to flour mills, where it is made into flour; the flour, in turn, is transported and is then used for the baking of bread, pies, cakes, etc. Again, the mining of iron ore leads to its trans-

Examples of the dependence of one industry upon another



Courtesy of Packard Motor Car Co.

Fig. 93. — The Packard Motor Car Company's factory at Detroit

portation on the lakes; that leads to the manufacture of iron and steel; the steel, in turn, is used in making many parts of automobiles; and these require rubber tires. Thus one important raw material starts a long series of industries. As a rule, no man works alone; he is dependent upon the work of others who precede him; and others are dependent upon him. Any one who does careless work or suddenly refuses to work threatens the prosperity of many persons whom he has never seen.

Rubber furnishes a splendid example of the growth of the present industry, and of the effect of one product upon many others.

The remarkable example of rubber

1. The history of the industry

In the eighteenth century some Europeans found that the milk of certain tropical trees could be formed into a substance which would rub out pencil marks; the name *rubber* was therefore given to it. In the beginning of the nineteenth century a Scotchman applied this milk to cloth to make it waterproof, but in hot weather it melted and became sticky and in cold weather it cracked. In 1842 an American named Goodyear discovered that by mixing sulphur with the rubber — a process called *vulcanizing* — these faults could be remedied. Soon the manufacture of waterproof clothing, boots, and shoes became a large industry. Indeed, the value of rubber boots and shoes made in the United States at present is about one tenth that of those made from leather. By using

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Fig. 94. Indianapolis

In the background is the Soldiers and Sailors Monument; this is in the heart of the city in the district known as the *Circle*.

a large percentage of sulphur it was found that hard rubber, such as that used in combs and fountain pens, could be produced.

2. Its present extent

There are now over 200,000 persons employed in manufacturing rubber articles in the United States. Most of our rubber boots and shoes are made in New England, but over one third of our manufactured rubber comes from in and around Akron, Ohio, which, like Detroit, grew enormously in the ten years preceding the census of 1920. That city is particularly noted for automobile tires. Why should such manufacturing be done in Ohio? About three fourths of our rubber is made into tires. If the United States uses two thirds of all the rubber produced in the world, what proportion of the whole do we consume for tires?

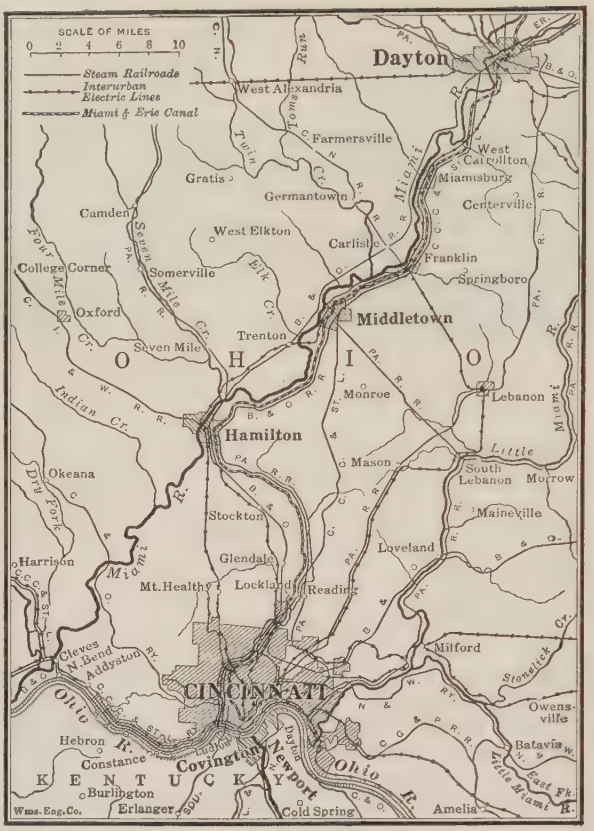


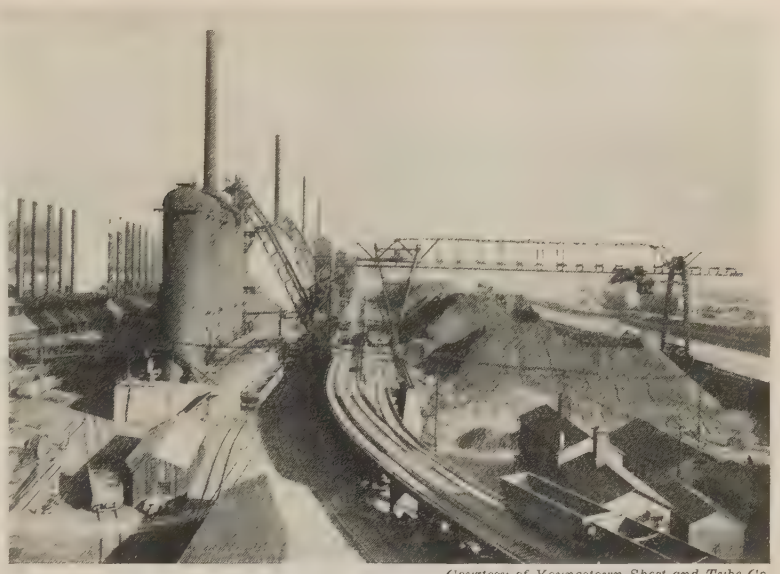
Fig. 95. — Cincinnati and vicinity

The variety of uses to which rubber has been put is one of the most remarkable of modern developments. Name some rubber articles used in electrical work; on bicycles; in gardening; in clothing; in football; in baseball; in the schoolroom. What rubber articles have you seen in drug-store windows? What hard-rubber articles can you name? Some of the things you probably will not think of are rubber

Fig. 96. — A portion of Cincinnati

Cincinnati is built on a high bank at the outer portion of a bend in the Ohio River (Fig. 95). In its early history its

packing used in engines, pumps, and valves; rubber belts on machinery; and rubber hose in the air-braking systems of trains. In all there are over 30,000 different articles made of rubber in the United States, requiring about four and one half pounds of rubber per person each year. All this rubber must be imported. How many tons do we require?



Courtesy of Youngstown Sheet and Tube Co.

Fig. 97. — Blast furnaces at Youngstown, Ohio

The eastern part of Ohio is well located for the manufacture of pig iron and steel. Locate Youngstown on Fig. 77. Where does the coal come from? The iron ore? What other cities in the North Central States are engaged in iron and steel manufacture? How do their advantages compare with those of Youngstown?

The vital importance of the Great Lakes. — Although the Great Lakes have frequently been mentioned in this text, they are of even greater importance than has been indicated. They are the greatest system of fresh water lakes in the world, and their area is so extensive that they have an appreciable effect upon the climate of the land about them. The fruit regions south of Lakes Erie and Ontario and east of Lake Michigan are proofs of this statement. Recall the facts you have learned about the influence of the lakes on fruit growing (p. 56).

Yet it is as a water route that the Great Lakes are of greatest importance. Forming our northern boundary — with the exception of one lake — they might be supposed to be

Courtesy of Cincinnati Chamber of Commerce

with the Ohio River in the foreground

growth was greatly aided by the commerce on the Ohio. What other factors can you name that have favored its growth?

Courtesy of The Goodyear Tire and Rubber Co.

Fig. 98. — A tire factory at Akron

The rubber used here comes chiefly from Sumatra and Brazil. Locate Sumatra on Fig. 400. Much of the cotton used in these factories is raised in Arizona (p. 141).

too far from the centers of industry to figure prominently in transportation. Nevertheless, they are worthy of comparison with our most important railroad systems.

Eight of our states, containing two fifths of the population of our whole country, border upon them. Name the eight. The region tributary to the lakes is the richest part of the continent in both farm products and minerals. In addition, the original forests, especially on the Canadian side (p. 35), were of enormous extent and value and are still extensive in Canada. The fact that grain, iron ore, lumber, and coal are especially bulky, and therefore very expensive to transport by rail, is what gives the lakes their special significance as a waterway (p. 76). Without the cheap transportation that they provide, it is doubtful whether the ores in the Lake Superior district would have been exploited; and without them the industrial development of both the Northeastern and the North Central States would be only a small part of what it has become.

As it is, one fourth of the tonnage in the United States merchant marine is found on these lakes; and during recent years twelve times as much freight has annually passed

© Ste. Marie Chamber of Commerce

Fig. 99. — The four locks at the American Soo (Sault Ste. Marie)

Locate this city and canal. On the extreme right and extreme left the gates of the locks are closed. To the left of the center two lake freighters are steaming into the lock to be "locked up," and to the right a large boat is just coming out of the lock. Why are so many locks needed? What do you think the "up-bound" boats are carrying? The "down-bound" boats?

through the Detroit River as through the Panama Canal. With the increase of farm products in the North Central States and in the adjoining section of Canada, the quantity of this traffic is likely to become even greater.

How difficulties in transportation on the Great Lakes have been met. — Great difficulties have had to be overcome in providing this convenient and cheap transportation. For instance, the lakes are on different levels. Fig. 77 shows how greatly they vary in elevation. How much lower is Lake Huron than Lake Superior? What is the descent from Lake Huron to Lake Erie? How much lower is Lake Ontario than Lake Superior? The greatest descent is that from Lake Erie to Lake Ontario, which is 327 feet. The Welland Canal, therefore, which connects these two, has a large number of locks. Locate it. Locate other canals that have been necessary and state the approximate number of feet that vessels must be raised or lowered at such points. The largest lake boats now in use are over 600 feet long, carry 10,000 to 16,000 tons of cargo, and draw seventeen or eighteen feet of water. It has been very difficult and expensive to build canals and locks that could accommodate such vessels, though the largest ocean vessels draw more than thirty feet of water. In order that the boats may carry the largest possible cargo with the shallow draft to which they are limited, they are made with flat bottoms and blunt at bow and stern.

The difficulty due to the different levels of the lakes, and how this is overcome

The time consumed in loading and unloading the boats used to be a serious handicap; but the speed with which iron, coal, and grain are now handled is one of the remarkable accomplishments in the lake transportation. It is not equaled anywhere else in the world. Partly on that account, cargo boats can now make the trip from Duluth to Buffalo and back again within ten days. What reasons do you see for such haste, when freight so imperishable as ore and coal is carried?

Other difficulties, and the extent to which they have been overcome

There are two difficulties that are not yet properly surmounted. One is the lack of freight for the westward trip. Why should there be this difficulty? Do you see any possible remedy in the future?

Courtesy of Crosby-Chicago Adv. Agency

Fig. 100. — Hauling logs by sled, North Central States

The snow and ice of the northern part of the United States make the transportation of logs easy. Very large loads are hauled on a single sled on roads that have been sprinkled to make them icy. These logs are oak and maple. What will the lumber be used for in the factories of Grand Rapids, Chicago, and elsewhere?

The other is far more serious. This wonderful waterway is open only about 220 days on the average per year. What per cent of the time is that? The rest of the year ice, or the danger of ice, closes navigation almost entirely. What must be some of the effects of this obstacle?

The demand for lumber in these states, and how it is met. — The demand for hard woods, such as hickory, oak, walnut, and ash, is much greater in the North

Extent of the demand

Central States than in the Northeastern group. The fact that leading furniture stores in New York City deal largely in furniture from Grand Rapids, Michigan, suggests how extensively furniture for the East comes from this quarter. The manufacture of farm implements — wagons, plows, corn planters, mowers, binders, reapers, threshers, and scores of other articles used on the farm — calls for additional quantities of hard wood. Since the supply of farm implements for a large part of the world comes from these states, this demand is especially large.

Courtesy of Crosby-Chicago Adv. Agency

Fig. 101. — A Wisconsin sawmill with its log pond

There are still many sawmills in the northern parts of Michigan, Wisconsin, and Minnesota, but the Great Lakes region, once the greatest lumber region of the country, now produces only a small part of our lumber. On the left in the picture is a pile of logs that have been unloaded from railroad cars. When a region is first lumbered the logs are usually floated to the mills on the rivers, but later railroads are built for the logs cut from the more distant parts of the forest.

Less soft wood for paper pulp is needed in the North Central than in the Northeastern States; for, in proportion to the population, much more printing is done in the latter (p. 35). Nevertheless, the consumption of pulp wood is very large; and the amount of lumber required for building is tremendous.

How the demand is met

The northern parts of Michigan, Wisconsin, and Minnesota were formerly covered with coniferous forests, and were at one time the leading source of pine lumber in the United States. This accounts for the establishment of important pine furniture factories in Grand Rapids. In recent decades, however, the supply in this region has rapidly decreased.

In considering other sources of supply, it should be remembered that from Illinois westward most of the land is either prairie or Great Plains, where there are scarcely any woods except along streams. What makes the lack of wood still more serious in much of this area is that there is little stone available for building, such as one finds in the East.

The lumber used in the North Central States comes from a variety of sources. In Figs. 147 and 188 note the leadership of the South and the West in lumber production. The vast forests in Canada, north of the Great Lakes, are also an important source of supply.

The great cities in these states are practically all important lumber centers, Chicago being especially important in this respect, as before stated, and Duluth being prominent also. Yet it is plain that they are only centers for collecting and distributing, for much of their lumber has been hauled hundreds of miles.

The scarcity of timber is leading to the use of numerous substitutes. In many localities the clay can be made into excellent

bricks, which are now used in enormous quantities. For construction of buildings in cities they are often preferred to lumber. Can you suggest why? Concrete has come into very extensive use. Metal laths are rapidly taking the place of the old style wooden laths, and composition shingles that will not easily burn are also becoming common.

Increasing use of substitutes

Facts to be especially well fixed. — 1. Location of the principal lake cities. 2. Of the principal river cities and other cities not on water routes. 3. Of the coal beds. 4. Of the iron and copper mines about Lake Superior. 5. Main transportation routes by water (show by a drawing). 6. List of farm products in which this section leads. 7. Location of leading wheat regions. 8. Of the Corn Belt. 9. List of leading manufactures.

Problems for independent study. — 1. See how long a list you can make of the uses of corn. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 131–134 (Ginn); National Geographic Magazine, 1916, vol. 29, pp. 29–30; Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 116–117 (Macmillan). 2. Make a list of common breakfast foods, and try to find where they are manufactured. 3. How has the material used in building fences changed in the last forty years? 4. Write a letter describing the change in farm scenes as one passes in late June from Cincinnati to the northwestern part of North Dakota. 5. Lake Erie extends about as far south as Lake Michigan. Why is not Toledo as great a city as Chicago? Adams, C. C.: *A Textbook of Commercial Geography*, pp. 152–153 (Appleton); Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 38, 47, 219–220, 221–223; National Geographic Magazine, 1919, vol. 35, pp. 1–42; Hotchkiss, C. W.: *Representative Cities of the United States* (Houghton Mifflin); Tarr, R. S.: *New Physical Geography*, pp. 313–314 (Macmillan). 6. The rivers in these states are much less used than the Great Lakes. How do you account for that? Journal of Geography, 1918, vol. 16, pp. 201–210; Adams, C. C.: *A Textbook of Commercial Geography*, pp. 149–153. 7. Corn produces fat in hogs, so that corn-fed hogs are lard hogs. Skimmed milk, together with rye, clover, and barley, produces lean hogs, especially good for bacon. Where would you expect to find most lard hogs raised? Most bacon hogs? 8. Write a composition on the prospects for the growth of Superior and Duluth. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 113, 172, 316; Journal of Geography, 1916, vol. 14, pp. 193, 230–233; Hotchkiss, C. W.: *Representative Cities of the United States;* McMurry, C. A.: *Type Studies from the Geography of the United States*, pp. 163–174 (Macmillan). 9. Ocean vessels of moderate size can reach Chicago and Duluth. Trace the route they would have to take. 10. Trace the route of iron ore from the Mesabi Range to Pittsburgh, telling (1) the means of transportation throughout the trip; (2) the

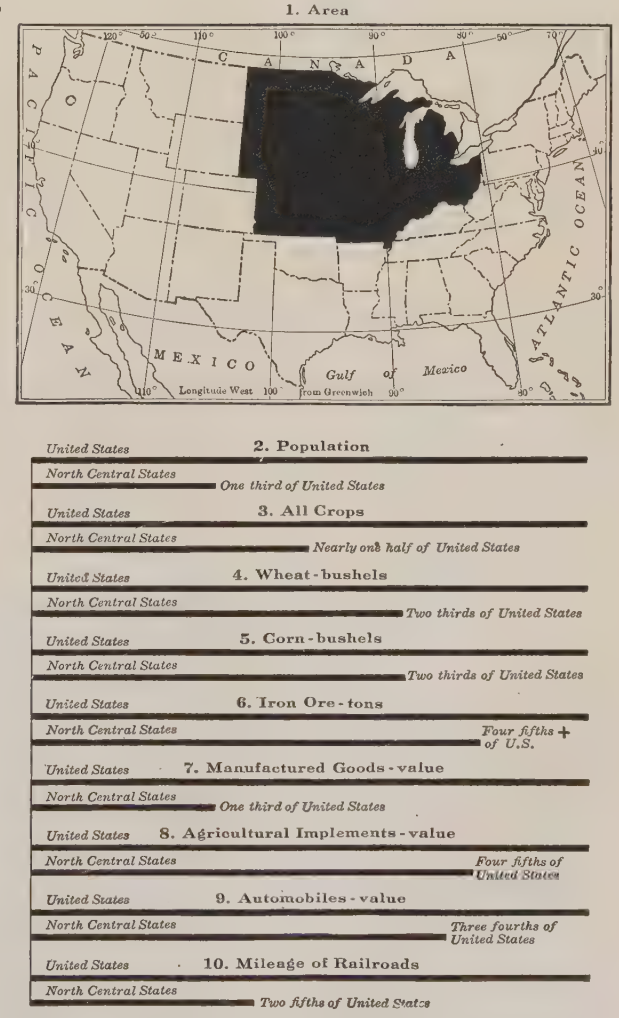


Fig. 102. — The North Central States in comparison with the entire United States

points where it is transferred from ship to railroad car or the reverse; and (3) the large cities passed. Hotchkiss, C. W.: *Representative Cities of the United States*, pp. 80–82, 123–125; McMurry, C. A.: *Larger Types of American Geography*, pp. 135–136 (Macmillan). 11. What other materials besides wheat are used for bread? Why is wheat preferred to all these? National Geographic Magazine, 1916, vol. 29, pp. 30–31; Bengtson, N. A., and Griffith, D.: *The Wheat Industry*, pp. 167–190 (Macmillan). 12. Visit a brickyard and describe the process of brickmaking. 13. What have been the causes of recent lowering of the lakes? 14. Find out how the lake boats are loaded and unloaded. 15. What makes of automobiles do you recognize? Locate on the map the city where each of these is made. 16. With what makes of automobile tires are you acquainted? In what cities are these made? 17. In what cities in the North Central States are watches made in large numbers? 18. In the advertising section of a leading magazine, classify the articles that are advertised as manufactured in the North Central States under the following heads: (1) food products; (2) clothing; (3) building materials; (4) home furnishings; (5) office fixtures; (6) miscellaneous.

How you can find needed articles in magazines. — The *Reader's Guide to Periodical Literature* is a record of all the articles that have been published in current magazines, grouped in books and arranged by years. For example, all articles which appeared in magazines during the year 1917 are grouped under certain headings. These are arranged in a book alphabetically and the exact reference given to the magazine in which the article may be found. This is an important help, for you can well realize that it would otherwise be difficult to find an article that appeared several years ago, even if you had all the magazines before you.

Let us suppose that you want data to debate this question: *Resolved*, that the treatment of the Indians by the United States Government has been wise. — You will take a *Reader's Guide* of a comparatively recent year, since you want up-to-date material. Let us choose the *Guide* for 1915–18. Turn to the letter "I," for we are going to look under "Indians." When we have found it, we see that a great many items are given, such as Diseases, Dwellings, Education, Folk lore . . . Government relations. The last is the one we want, and this is the way in which the references to the magazines are quoted:

From the War Path to the Plow — F. K. Lane. il Nat. Geog. M. *27*: 72–87 Ja. '15.

"il" indicates that the article is illustrated. If pictures are lacking, "il" is omitted. The second line signifies that the article by that name and author will be found in the 27th volume of the National Geographic Magazine on pages 72–87, or, if the numbers have not yet been bound, in the number for January, 1915.

3. The Southern States

State	Area in Square Miles	Population (1920)	Largest City	Population (1920)
Alabama	52,000	2,348,000	Birmingham	178,000
Arkansas	53,300	1,752,000	Little Rock	65,000
Florida	58,700	968,000	Jacksonville	92,000
Georgia	59,300	2,896,000	Atlanta	201,000
Kentucky	40,600	2,417,000	Louisville	235,000
Louisiana	48,500	1,799,000	New Orleans	387,000
Mississippi	46,900	1,791,000	Meridian	23,000
North Carolina	52,400	2,559,000	Winston-Salem	48,000
Oklahoma	70,000	2,028,000	Oklahoma City	91,000
South Carolina	31,000	1,684,000	Charleston	68,000
Tennessee	42,000	2,338,000	Memphis	162,000
Texas	265,900	4,663,000	San Antonio	161,000
Virginia	42,600	2,309,000	Richmond	172,000
West Virginia	24,200	1,464,000	Wheeling	54,000

Questions. — 1. Which state far outranks all the others in area? Find out from your textbook in history how so large an area of land happened to become a single state in our Union. 2. Compare the largest cities in size with the largest cities in the states that you have previously studied.

Density of population of these states as compared with that of the North. — Fig. 103 shows the density of population in the Southern States. The people are somewhat evenly distributed over the territory with the exception of two districts, one in the southeast and the other in the west. Name the two states that have large areas very sparsely settled.

At only three points are twenty or more dots close together, indicating a city of over 200,000 population. Find these three points, and name the cities represented. Note their populations in the figures on p. 94. If you compare the North and the South in density of population as shown in Figs. 21, 62, and 103, you will see what a striking difference there is in the number of large cities. (For the sake of brevity, we use the term *North* to mean the Northeastern and North Central States combined.) Out of the twenty-five largest in the United States, only one, New Orleans, is in the South. How do the Southern States compare in area and population with the North Central States (p. 62)? From these facts, what occupation may be expected to be most prominent in the South?

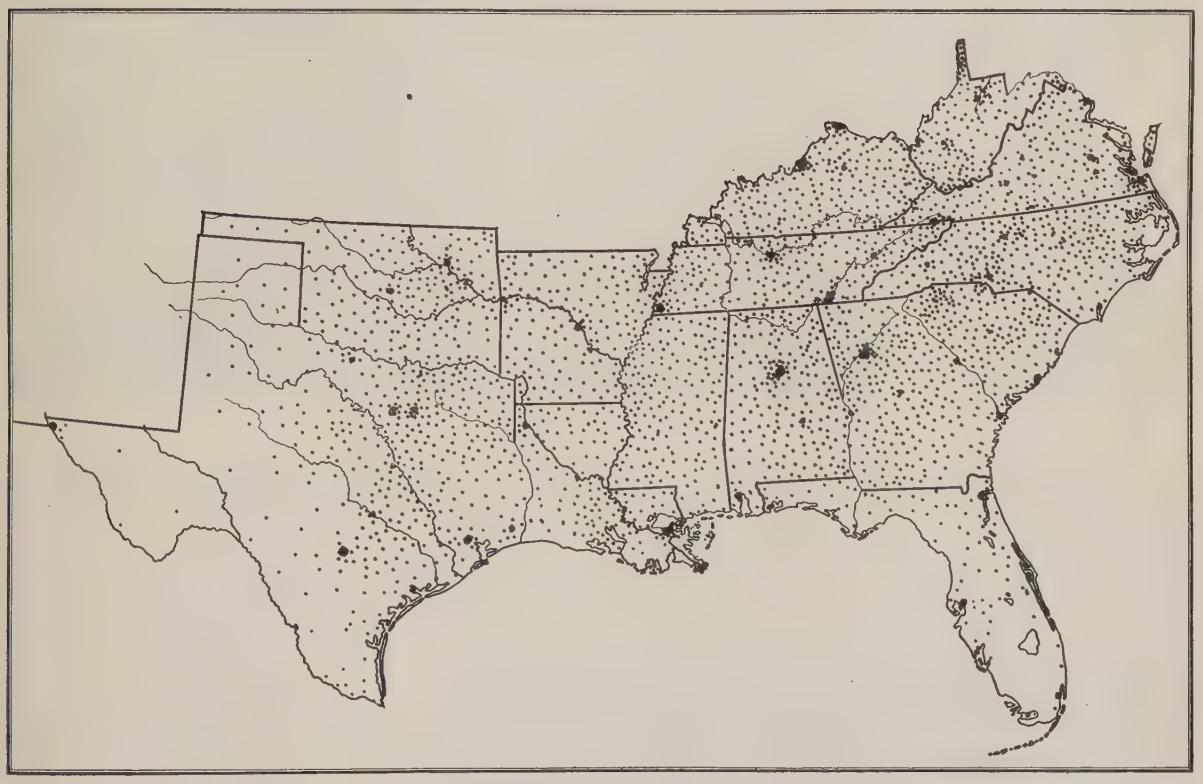


Fig. 103. — Distribution of population in the Southern States
Each dot represents 10,000 people.

Extent to which the South raises the same farm products as the North. — If you turn to Fig. 70, you may be surprised to find

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Fig. 104. — A cattle ranch in western Texas

Great numbers of cattle and horses are raised in western Texas. Formerly the cattle were herded on open ranges on public land. Now most of this land has been purchased by cattlemen and fenced in with barbed wire. Some portions are devoted to dry farming; dry-farm crops (p. 144) are raised for feed during the winters. Rivers are few in this region and the cattle often come long distances to a water hole or a stream.

how much corn is raised in these states. While the Corn Belt is in the North, there is only one Southern state that does not produce considerable quantities of that grain. Which one is it? Which Southern state seems to have the greatest proportion of its land in corn? Note that a large amount is raised even in the Appalachian Highland.

Extent to which it approaches the North in grain and live stock

Oats are not so evenly distributed as corn, yet this crop is raised in every state.

In view of the large amount of corn, one might expect to find many hogs. Fig. 230 shows how large the number actually is. Outside the Corn Belt, the Southern States lead in their production. Nor is this section very far behind in cattle, as can be seen in Fig. 73. Texas, especially, is noted for beef cattle. Even the arid western part of that state raises a large number, the natural grass of the Great Plains being supplemented by cottonseed cake and by alfalfa, kafir corn, and other fodders. There are, however, only about two fifths as many dairy cattle in the South as in the North. The lack of great cities partly accounts for this.

From Fig. 64 one might conclude that very little wheat is grown in the South; but that is hardly true. Most of the farms raise some wheat each year for home use, and nearly every large town has a flour mill, where the neighboring farmers take their corn or wheat.

Apples are grown for market in the cooler portions of the South. They are exten-

sively grown in the Appalachian Highland. Some of the finest apples come from Virginia. More peaches are raised in the Southern States than in any other section of the United States. The famous Georgia peaches appear in the Northern market each year long before those of New Jersey and Michigan are ripe.

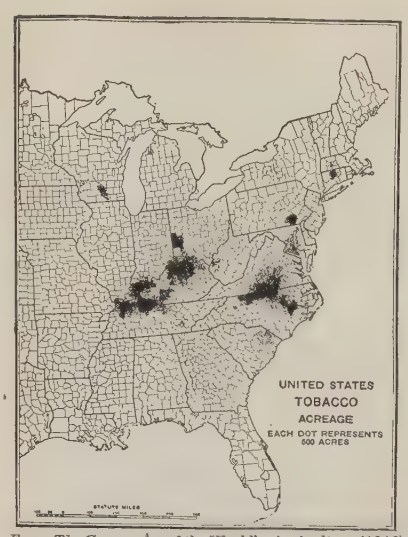
Extent to which the same fruits and vegetables are raised

The common vegetables of the North are also grown in the South. It is the South that keeps the markets of the Northern cities supplied with lettuce, radishes, string beans, and new potatoes through the winter and early spring. It far surpasses the North, also, in the production of sweet potatoes; though New Jersey grows them extensively, nine tenths of our supply comes from the South.

There are four Northern states in which tobacco is a prominent crop. Find which these are from Fig. 105. Yet the same figure shows that the South produces most of the tobacco raised in the United States. In fact, more than four fifths of it is grown there. Name the states that lead in its cultivation.

Superiority of the South over the North in production of tobacco

There are two principal tobacco regions. In Tennessee and parts of Kentucky the well-known Burley tobacco is grown; this is usually cured by being exposed to the air. For that purpose many wide-roofed, open sheds are built, in which it is hung, protected from the rain, and exposed to the air, until the leaves turn a beautiful brown. In Virginia, North Carolina, and other parts of Kentucky, it is cured by heat and smoke. A common sight there during the early fall is that of tobacco barns with smoke issuing from their cracks and crevices; the heat and smoke are produced by burning wood on the earthen floors beneath the stalks and leaves of tobacco, which are hung loosely from racks.



From The Geography of the World's Agriculture (1910)

Fig. 105

Name the leading tobacco-growing sections, by states. Is tobacco a Northern or a Southern crop?

© *H. P. Cook*

Fig. 106. — A field of tobacco

The tobacco plant has a stout stem from which grow large, thin leaves, which constitute the valuable part of the plant. About how high are the stems in the picture? The young tobacco plants are delicate and are usually protected by large awnings of canvas, and later transplanted into the open fields.

Practically all the farm products of the North are grown also in the South, some of them in large amounts and a few of them even more extensively than in the North. In general, however, it is far behind the North in the quantity of such products.

Possibility that the South will closely compete with the North in these crops. — If the South can grow all these things, why should it not produce larger quantities? Why, in short, should it not compete closely with the North in Northern crops? The South enjoys many peculiar advantages for such production. In much of Florida gardening can be carried on the whole winter through; and in sections a little farther north two or three different crops can be raised in one year. For example, Irish potatoes are planted early enough to be up soon after the last killing frost and are later harvested as "new potatoes." Quickly the same ground is planted in corn. Then, before this has grown to any great height, soy beans may be planted between the rows; or on other farms corn may be followed in the late fall by winter wheat or oats or rye.

© Gilliams Service

Fig. 107. — A truck garden in the northern part of Florida

Beans are being packed in baskets to be sent to the markets of New York, Philadelphia, and other cities. In this part of Florida garden truck is ready for the market in early March, long before the gardeners in the North are beginning to plant. On light, sandy soil like that of the Coastal Plain the plants grow much more rapidly than on heavier soil.

The Northern farmer has much fear of a late frost in spring or of an early one in the fall; but the long growing season in these states relieves the farmer who is growing only one Northern product from such danger. Besides, not being hurried to get in his crop for fear of frost in the fall, he can do most or all of his work himself and thus avoid employing extra help at high cost.

In the North all root crops must be dug in the fall and stored in cellars or other well-protected places. In the South the storage of such crops for the winter is a much simpler matter. As far north as Tennessee, except at high elevations, root crops may be left in the ground if covered with two or three inches of dirt. The ground here rarely freezes more than an inch or two below the surface during the winter.

Peculiar advantages of the South for such production

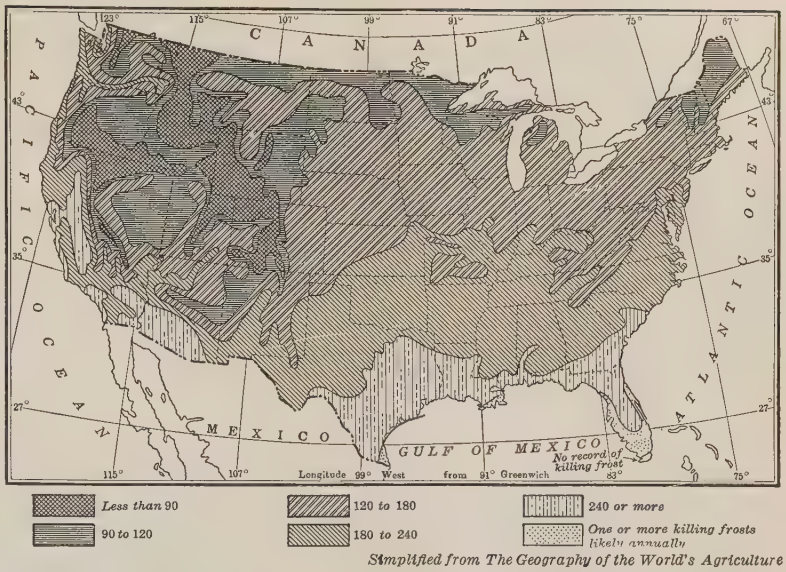
Finally, with grass and other green fodder growing seven or eight months in the year, so that there need be no long feeding season under shelter, and with the winters so mild that warm stables are not necessary, some of the worst difficulties in the raising of live stock in the North are avoided.

Nevertheless there are serious difficulties to be overcome. The hot weather and heavy

rains are a great hindrance. For example, corn needs cooler fall weather in order to mature properly, and grass flourishes better in a cooler climate.

Disadvantages of the Southern climate for Northern products

The long summers are hard on live stock of all kinds, on account of the heat and the insects. The warm weather likewise makes it difficult to preserve milk and butter, and thus checks dairying. Wheat of the Northern variety does not grow so well; and the Southern wheat is less valuable for general use because it contains less gluten. The flour made from it is pastry flour. This is good especially for hot bread or biscuits, to be used in a hot, moist climate where yeast bread quickly molds.



Simplified from The Geography of the World's Agriculture

Fig. 108.— The average number of frostless days in the United States

This map indicates roughly the length of the growing season. What portion of the United States has never experienced a killing frost? How does the length of the growing season along our northern compare with that along our southern boundary? Why do the areas of few frostless days extend so far south in the Western States? (Fig. 17 gives a clue to the answer.)

The cold of winter is not severe enough to kill harmful insects, so that there are more insect pests in the South than in any other section of the country. Even fall plowing, which in the North destroys many insects in the ground by uncovering and exposing them to the rigors of winter, is of little value for that purpose in the South. In consequence, successful farming there calls for much knowledge of insect life and of methods of destroying it for the protection of plants.

Again, the heat and the rain together cause weeds to flourish to an unusual degree. At the same time it is especially difficult for man to destroy them, because the high temperature is likely to reduce his energy for hard manual work.

For several reasons the soil in certain extensive areas lacks fertility. Much of the Coastal Plain is too sandy and sterile. It was once a sea bottom (p. 11), and was so slowly elevated that the waves and currents had ample time to sort out and carry away the finest materials for plant growth. The soil in

The poor quality of soil in some sections

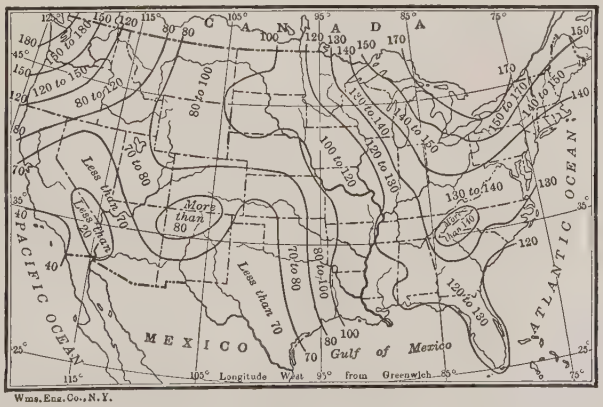
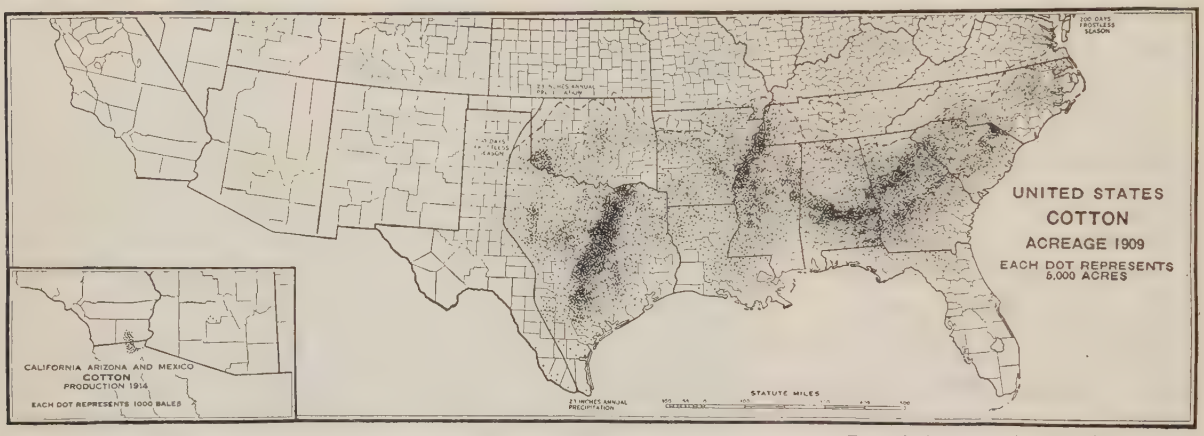


Fig. 109.— Number of days in the year during which some rain falls

such a region is likely to be so light that it will not retain fertilizer placed upon it; the latter is soon carried away by the heavy rains, so that a new supply has to be provided.

A good many of the disadvantages from which the South now suffers in competing with the North are sure to be overcome. Indeed, there has been much improvement in agricultural methods in recent years, and without doubt this section will greatly increase its quantity of Northern crops. Nevertheless, the South will probably never approach the North Central States in the production of grain and live stock; it is not at its best in these types of farm activities. On the other hand, it has its own types in which it already holds first rank, and in which the North would have no chance whatever if it should attempt to compete. Let us see what some of these are. The greatest crop peculiar to the South is cotton. How does it compare with corn in importance?

How cotton compares with corn in importance. — Corn is by far the most important crop in the United States, being one of the leading sources of food for men and animals. In the South it is made into "hog, hominy, and hoecake." In the North comparatively little is directly consumed by man; most of it is fed to cattle and hogs, and eaten in the form of beef and pork. It takes from ten to twelve pounds of corn to make one pound of beef, and from five to six pounds to make one pound of pork. Since the United States exports vast quantities of meat, it is evident that foreign countries also are greatly dependent upon our corn for food.



From The Geography of the World's Agriculture

Fig. 110

Name the more important cotton-producing states. From Fig. 123 find out which land regions in the South are best adapted to the raising of cotton. What ports would naturally serve as the shipping points for the cotton of each of these states? Why does the Cotton Belt not extend farther west in Texas? (See p. 101.) Since this map was made, cotton production has considerably increased in Arizona and southern California.

Cotton and wheat in the United States rank next in value to corn; in some years the value of wheat exceeds that of cotton, and in other years the reverse is true. Cotton is thus the second or third great American crop, as valuable in providing clothing as corn and wheat are in providing food. The principal materials that compete with it are wool, silk, and flax, but it far outranks all three together. It is almost the sole material for clothing in tropical countries, and is taking the place of these others more and more in the temperate regions.

Our country on the average produces about seventy per cent of the world's corn and about sixty per cent of its cotton. Cotton manufacture is one of the leading industries in New England, which obtains the raw material chiefly from the South. It is one of the leading industries of Great Britain also, and of France and Belgium and other European countries and Japan as well; all these countries depend mainly upon our Southern States for their cotton. Thus many parts of the world look to America for material for clothing as well as for food.

Why the South has so nearly a monopoly of cotton. — If cotton is the principal material throughout the world for so necessary a thing as clothing, why do not other countries produce more of it? At present there are only two others — India and Egypt — that are prominent in its cultivation; and India grows only about eighteen per cent of the world's supply, while Egypt is limited to six per cent. Why has the South so nearly a monopoly?

How the climate favors cotton

There are several reasons. First of all, it has a climate over a wide area that is peculiarly adapted to cotton. That plant requires about seven months free from frost, and plenty of rain. Fig. 108 shows the area in these states that has not less than 200 days per year without frost. Trace its boundaries, and estimate its length east and west. The areas in the United States where cotton is produced are shown in Fig. 110. If you recall the fact that the altitude of the Great Plains in Texas increases toward the west, you can understand why there is too much frost for cotton in western Texas. Can you, then, explain why parts of Tennessee and western North Carolina are not included in the Cotton Belt? In addition to the states of this section, two of the Western States are growing increasing quantities of cotton. See Fig. 110 and p. 141.

Fig. 18 shows the rainfall in the United States. What does it tell you about the amount of rain in the Cotton Belt? The season when the rain comes is important, as well as its quantity. The fields must be plowed and planted in April and May, when it is fairly dry. In midsummer, when the plants are growing, showers are more abundant, which is very desirable. In the fall, when the growth of the stem needs to be checked, so that the cotton can develop, there is less rain; and the same is true later, when the

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Fig. 111. — Picking cotton

The picking of the cotton crop, here done by negro men, women, and children, is the most expensive operation connected with cotton growing. Several pickings are required for each harvest. Cotton-picking machines are now being introduced with some success.

105°
101°
97°
93°
37°
33°
29°
25°
NEBRASKA
COLORADO
KANSAS
MISSOURI
NEW MEXICO
OKLAHOMA
ARKANSAS
TEXAS
LOUISIANA
ROCKY MOUNTAINS
GREAT PLAINS
OZARK PLATEAU
LLANO ESTACADO
MEXICO
GULF
Pueblo
Colorado Springs
Santa Fe
Amarillo
Wichita
Kansas City
Topeka
Jefferson City
Bartlesville
Enid
Tulsa
Guthrie
Oklahoma City
Sapulpa
Muskogee
Okmulgee
Shawnee
Chickasha
Fayetteville
Fort Smith
McAlester
Lawton
Hot Springs
Little Rock
Pine Bluff
Ardmore
Wichita Falls
Denison
Sherman
Paris
Texarkana
Greenville
El Paso
Fort Worth
Dallas
Ranger
Abilene
Sweetwater
Cleburne
Tyler
Marshall
Shreveport
Monroe
Corsicana
Palestine
San Angelo
Temple
Waco
Austin
Beaumont
Lake Charles
Port Arthur
Houston
Del Rio
San Antonio
Galveston
Galveston Bay
Matagorda Bay
MATAGORDA I.
ST. JOSEPH I.
Corpus Christi
Corpus Christi Bay
Laredo
PADRE ISLAND
Brownsville
Matamoros
Salomon R.
Smoky Hill R.
Arkansas R.
North Canadian R.
Cimarron R.
Canadian R.
Red R.
Washita R.
Pecos R.
Rio Grande
Colorado R.
Brazos R.
Trinity R.
Neches R.
Sabine R.
Ouachita R.
Guadalupe R.
San Antonio R.
Nueces R.
Santiago Mts.
Houston Ship Canal
SOUTHERN STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 25 50 100 150 200
National capital
State capitals
Canals
Important highways
Railroads
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
WILLIAMS ENGRAVING CO., N.Y.
Longitude
West

Fig. 112

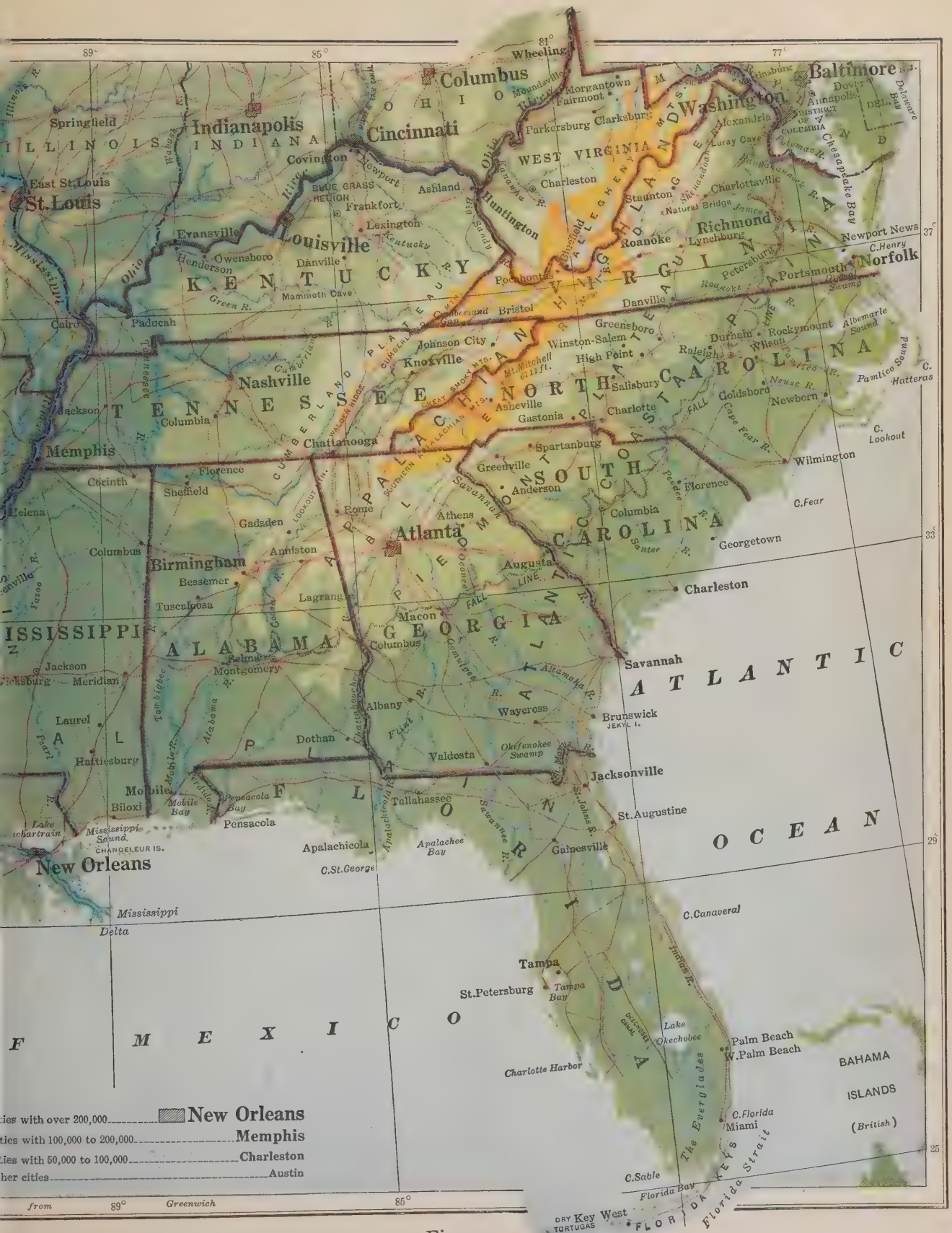
Wheeling
Columbus
Baltimore
Washington
Springfield
Indianapolis
Cincinnati
Morgantown
Fairmont
Parkersburg
Clarksburg
Alexandria
Annapolis
DISTRICT OF COLUMBIA
Luray Cave
East St. Louis
St. Louis
Covington
Newport
Ashland
Charleston
Staunton
Charlottesville
Natural Bridge
BLUE GRASS REGION
Frankfort
Lexington
Huntington
Richmond
Evansville
Louisville
Roanoke
Lynchburg
Newport News
Owensboro
Henderson
Danville
Pocahontas
Norfolk
Portsmouth
Mammoth Cave
Bristol
Cairo
Paducan
Johnson City
Greensboro
Winston-Salem
Durham
Rockymount
Raleigh
Wilson
High Point
Knoxville
Nashville
Salisbury
Goldsboro
Newbern
Asheville
Jackson
Columbia
Gastonia
Charlotte
Memphis
Chattanooga
Spartanburg
Greenville
Wilmington
Florence
Corinth
Sheffield
Anderson
Rome
Athens
Columbia
Helena
Gadsden
Atlanta
Georgetown
Columbus
Anniston
Birmingham
Augusta
Bessemer
Charleston
Tuscaloosa
Lagrange
Macon
Savannah
Columbus
Montgomery
Jackson
Meridian
Albany
Wayeross
Brunswick
Laurel
Dothan
Valdosta
Hattiesburg
Jacksonville
Mobile
Biloxi
Tallahassee
St. Augustine
Pensacola
Apalachicola
Gainesville
New Orleans
C. St. George
Mississippi Delta
C. Canaveral
Tampa
St. Petersburg
Tampa Bay
Lake Okeechobee
Palm Beach
W. Palm Beach
BAHAMA ISLANDS
(British)
Charlotte Harbor
C. Florida
Miami
C. Sable
Florida Bay
Florida Strait
Key West
DRY TORTUGAS
ATLANTIC OCEAN
MEXICO
Cities with over 200,000 — New Orleans
Cities with 100,000 to 200,000 — Memphis
Cities with 50,000 to 100,000 — Charleston
Other cities — Austin
from 89° Greenwich
85°
77°
81°
37°
35°
33°
29°
25°

Fig. 112

Questions on Fig. 112. — 1. Note from Fig. 19 which of these states are in the Southern group. Only the most important features are indicated outside of these states. 2. Make a list of seven of the chief railroad centers in this group of states. 3. Name the most important cities on the Fall Line. 4. Three of the Southern States consist entirely of lowlands. Which are they? 5. If you wish to look up smaller places than are indicated here, refer to Fig. 499 or 501.

Fig. 113. — A cotton boll ready for the picker

The cotton fibers grow in a pod or boll about the seeds. As the seeds ripen the boll bursts and the fiber becomes fluffy as shown in the picture. The fiber is intended by Nature to serve as a protection to the seed during the wet fall and winter.

time for picking comes and many rains would injure the exposed cotton. Thus the rainfall is remarkably well adapted to the needs of cotton. In addition, the cooler weather of early autumn further checks the growth of the stem, and thus aids the development of the cotton *bolls*, or pods.

The character of the soil is another important factor. Florida produces very little cotton, as you can see, partly because its soil is very sandy and not adapted to such growth. Fig. 123 suggests that the entire Coastal Plain from North Carolina to Texas suffers the same disadvantage. The most favorable areas are clearly shown by the proportion of land planted in cotton. In what states are they? In what parts of these states?

Three other conditions that favor the raising of cotton

A third and very important matter is abundance of cheap labor. Cotton cannot be raised, as wheat is, largely by the use of machinery. It requires far more labor; and it requires this throughout most of the year, from the beginning of April until the latter part of December. The South is favorably situated to meet this demand. It contains over 8,000,000 negroes, who are peculiarly adapted to work in that climate, and whose greatest single task, therefore, is the raising of cotton.

Finally, conveniences for transportation are a vital factor. There is a surprising number of outlets by water from the Cotton Belt. In Fig. 11 count the number of navigable rivers reaching the sea between Virginia and Texas. Note also the number of harbors from which goods can be shipped to any port in the world. Which are the more important ones, judging by the size of the type? Where navigable rivers do not exist, and in very many places where they do, there are railroads, as shown in Fig. 112.

Thus there are four very important con-

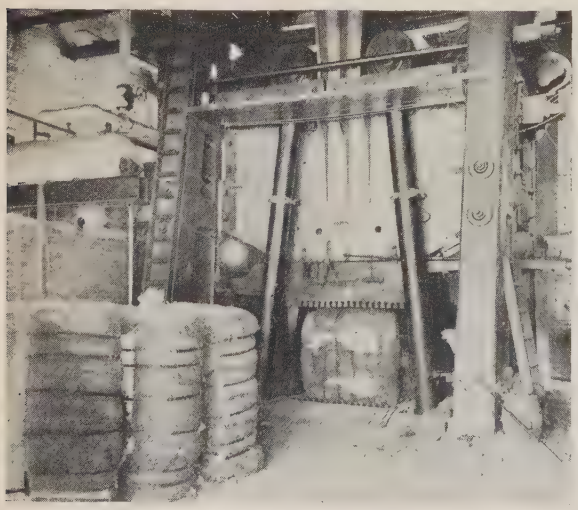

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Fig. 114. — A cotton compress

Cotton bales, rectangular in shape, weighing about 500 pounds each, covered with coarse bagging and bound with bands of iron, are pressed by steam compresses into greatly reduced sizes suitable for transportation.

ditions that the South meets for the production of cotton, and it meets them to an admirable degree over a wide area. There are many other regions of the world that satisfy some of these conditions; but none that by any means meets them so completely as does the South.

Injury to cotton from the boll weevil. — In spite of these important advantages, the cotton growers of the South do not have things entirely their own way; for cotton has many enemies. The worst is the boll weevil. This is an insect that in the worm stage bores about in the unopened bud, or *square*, of the cotton and eats the growing fiber. In the early 'nineties it crossed the Rio Grande from Mexico and appeared in the fields of Texas. Fig. 116 shows how steadily it has advanced over the Cotton Belt since that time.

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Fig. 115. — Cotton on the levee at New Orleans

The cotton, after the seed has been separated from it, is pressed into great bundles or bales weighing about 500 pounds each. These are held together by iron bands. Jute or other coarse cloth is wrapped around the cotton before baling to keep it clean. The cotton in some of these bales is not entirely covered. River steamboats, which have brought in loads of cotton, may be seen on the right.

One of the best ways to reduce the ravages of the weevil is to keep every farm as clean as possible, to burn all weeds, leaves, and other material that might harbor the insects in winter, and to plant varieties of cotton that mature early. Yet enough of them live over to colonize the fields again in the spring.

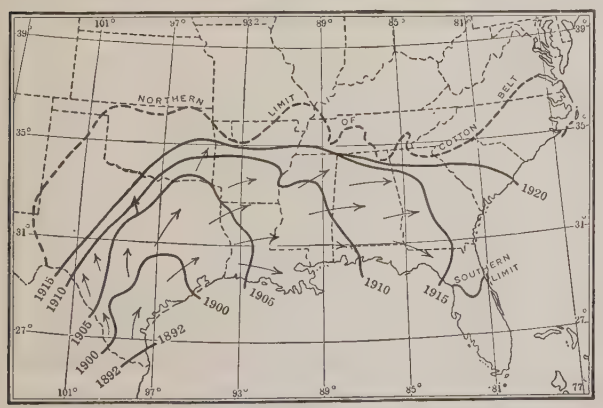


Fig. 116. — Spread of the cotton boll weevil

The boll weevil has cost the South many millions of dollars. In some districts cotton is almost the sole crop and is raised on credit, each year's yield being mortgaged in advance in order to meet the expense of its production. When, on account of the boll weevil, a failure has resulted for several years in succession, and bankers can make no further loans, many farms are abandoned, and the workers leave to seek work in the cities and in the North. How are such events likely to affect people in the North, and even in Europe?

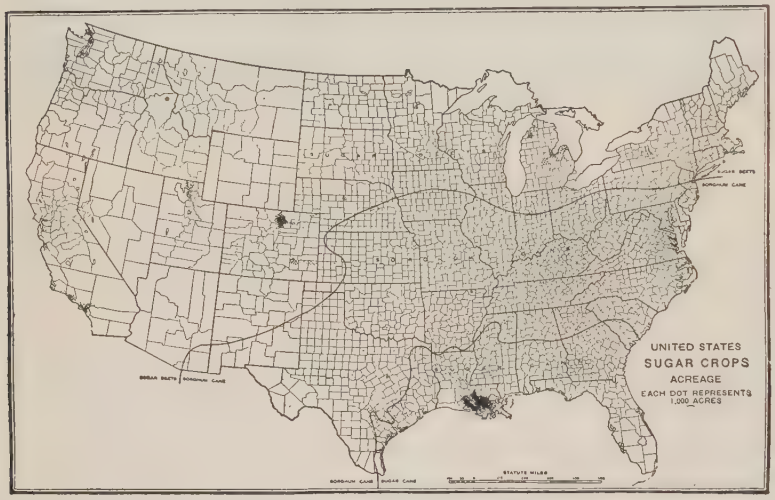
The production of cane sugar in the South. — While small patches of cane sugar are grown in many parts of the South, there

is only one extensive. That lies chiefly in southern Louisiana, on the low, flat lands forming the delta of the Mississippi River, but it extends westward into Texas. Locate this area in Fig. 117. Fourteen parishes in Louisiana raise little else than sugar cane. The plantation here described is in this region.

How the industry is conducted on a typical plantation

1. Its location and character

The land is only a few feet above the level of the Gulf. It is surrounded by dikes and has a costly system of drainage, for the rainfall is about sixty inches per year and averages five to six inches per month during the growing season. Note the rainfall in this district as shown in Fig. 18. Sugar cane requires from fifty to sixty-five inches of rain per year.



From The Geography of the World's Agriculture (1910)

Fig. 117

South of the lower black line cane sugar is grown; between the two lines, sorghums (p. 144); north of the upper line, sugar beets.

The plantation which we are discussing contains somewhat more than 10,000 acres; it lies along a *bayou*, or estuary, and is fifteen miles in length. This may seem large; but it is by no means the largest plantation in this district.

A superintendent has general oversight of all the farming operations. From 800 to 1,000 persons are employed on the plantation throughout the year, nearly all of whom are negroes. During the planting and the harvesting seasons extra workers are called in, sometimes as many as 300. The laborers live with their families, so that this plantation supports, all together, not less than 2,000 persons. The families are grouped at convenient points for work, each group forming a small village.

2. The workmen required, and the methods they use in growing the cane

Only about 3,400 acres are planted with sugar cane at one time. How many square miles does that make? A large area must be set aside for seed cane, and another for corn and peas. The peas are particularly valuable for restoring the ground to a good condition for growing more cane. These three crops are kept growing in rotation, any one portion of land bearing the same kind only once in three years.

There are two planting seasons, one in early October and the other in early spring. Cane planted in the fall gets an early start in the spring, so that the greatest possible returns are likely to be obtained. Winter weather, however, often kills the sprouts of the fall planting, and a re-planting then becomes necessary in the spring. The ground is prepared by deep plowing and is laid off in furrows six feet apart in which the cane stalks are laid. Since it is important to have good growth, and many of the buds fail to sprout from the joints in the stems, the

stalks are laid in two rows side by side in the furrows. Then they are covered with dirt from three to six inches deep. The growing plants are cultivated much as corn is, until about the first of July, when they become too high to require further attention.

Harvest is an especially busy time. The cane has to be cut and stripped of its leaves by hand, after which the work is all done by machinery. It is loaded on large wagons with the help of gasoline engines and hauled to the railroad. There are thirty-five miles of track on the plantation. When the wagon comes to the railroad, it is picked up bodily and its contents are dumped into a freight car.

3. Method of harvesting, and the yield of sugar

The average yield of cane is from fifteen to twenty tons per acre; but it sometimes reaches twenty-five or thirty. One ton produces about 160 pounds of sugar; and one person in the United States consumes on the average fully eighty pounds. From these figures you can estimate how much sugar one acre produces and also how much sugar is required to supply your family for one year.

The sugar making takes place in the late fall and winter, because the cane is allowed to grow as long as possible in the fall. This plantation is provided with a mill which can grind 1,200 tons of cane per day, so that the average crop can be made into sugar in about sixty days. It generally takes nearly three months, however. Nearly all the men who work in the mill are employed at other times on the farm. This shows the advantage of having the farm and the mill under one management.

The outlook for any great expansion in the cane-sugar industry in the South is not bright, however, for it suffers serious competition from two sources. In the first place, although this delta land is the best for the purpose in the United States, its climate is not so favorable for cane as that of near-by Cuba and the other West Indian islands. Sugar cane is a tropical product and cannot stand frost. It requires twelve months of growth in order to reach full maturity. Although this land is so low and so nearly surrounded by the Gulf that it is warm even in winter, the open Mississippi Basin allows cold waves from the Dakotas (p. 238) to sweep its whole length, and during most winters the temperature

The future of the cane-sugar industry in the South

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Fig. 118. — Cutting sugar cane near Baton Rouge, Louisiana

Sugar cane grows from eight to twenty-four feet high, with the stalks close together. It is cut by hand when ready to harvest; the cutter, using a long, heavy knife, severs the stalk close to the ground. Attempts to use machinery in the cutting have proved unsuccessful.

drops low enough at some time to harm the cane. In what temperature region is the southern part of Louisiana (Fig. 12)?

Thus the winters shorten the growing season by several weeks, thereby reducing both the quantity of cane and its sugar content. In addition, they necessitate a new planting each year, which is very expensive because it takes much labor and consumes about one fourth of the previous year's crop. In Cuba the cane lasts throughout the year, and from six to twenty-five crops can be obtained from a single planting.

© *Ewing Galloway*

Fig. 119. — Loading sugar cane

What difference do you see between the methods shown in this picture and those described on p. 107?

The other source of competition is the beet-sugar industry, which is gaining ground rapidly. The beets of the United States in some years produce three or four times as much sugar as does the Southern cane, though the beet-sugar industry is only in its infancy. Additional facts about it are presented on pp. 143 and 322.

The promising future for rice production in the South. — The outlook for rice cultivation in the South is far better than for that of sugar. Rice, the world over, is grown in delta lands, where the climate is warm, the soil moist, and the land easily flooded. In the United States it was formerly grown only in South Carolina and Georgia, on the borders of the tidal rivers where the land was diked and could easily be flooded at high tide. The principal area for its cultivation is now in two other states, as shown in Fig. 120. Which are these states? Since the year when this map was compiled, however, the Sacramento Valley in California has produced great quantities (p. 140).

Place and conditions of rice cultivation

Until recently rice has been a very expensive crop, one man in Japan, on the average, being able to farm only one acre of it, and one man in China from one half to two and one half acres. The land on our Gulf coast, however, is very level; and in the 'eighties some farmers from the Wheat Belt who settled in this section discovered that modern machinery could be used there in the production of rice just as in the case of wheat. In the Louisiana-Texas area, therefore, one man cares for as much as eighty acres, and for that reason the cost of rice production is much less than half what it now is in China.

The rice land is divided into fields of twenty

to one hundred acres, with dikes about them to hold the water. The land, while still dry, is plowed and sown with the grain, like wheat land. Then, when the rice is a few inches high, the fields are flooded for two or three months from neighboring bayous or from wells. Shortly before harvest time the water is drained off, so that the ground can dry out and harden. Then the harvesting machines can move over the fields without difficulty.

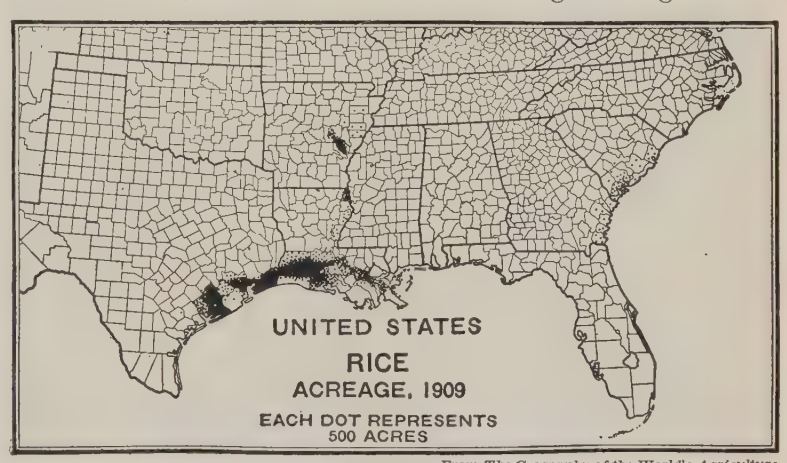
Because of many favorable conditions there seems to be a remarkable future for rice cultivation in the South. There is throughout the world a tremendous demand for rice, which is likely to increase. Three fifths of all the tilled land in Japan is given up to that product alone, and its value as food in the Orient is more than that of corn and wheat together in America. One person in the Orient on the average probably eats not less than 275 pounds per year, making rice, when the immense population is considered, by far the most important food of the world. On the other hand, we have never become great rice eaters. One person on the average in the United States consumes only 9.3 pounds. If it is so valuable a food in the Orient, it seems reasonable to expect that it will become a much more common food than it has been throughout Europe and America.

Prospects for growth of the industry

Meanwhile, we have been producing only about three fourths as much as we have consumed, although we can raise it so much more cheaply than the Orientals, and have an enormous additional area suited to rice culture. From the Colorado River of Texas eastward to the Mississippi River and then northward along the flood plains of this river as far as Memphis, Tennessee, much of the land is admirably adapted to rice. This district embraces an area several times the amount already under cultivation. Small sections of it are already in rice, as Fig. 120 shows; and the rest of it may soon be utilized.

Extent of cultivation of tropical and subtropical fruits. — Its ability to produce tropical and subtropical fruits gives the South one more advantage in agriculture over the North. The southern location of Florida and the fact that it is so nearly surrounded by warm waters makes it much superior to the Gulf coast farther west in the production of these fruits. The southern third of Florida is quite free from the danger of frost. The only state with which it has to compete seriously is California; it has, however, a decided advantage over that state in its nearness to the New York and Chicago markets.

Florida grows about three fourths of the grapefruit and limes, and about one fourth of the oranges, produced in the United



From The Geography of the World's Agriculture

Fig. 120

In addition to the rice-producing areas shown on this map, there is an important rice district in California (p. 140).

States, most of the rest being grown in California (p. 141). Many of our pineapples and tangerines are raised in Florida also. The production of such fruits is the leading industry in the state.

The special opportunity that the South offers to the farmer. — The South probably offers a better opportunity to the man who wants to farm and who has little capital than does any other section that has extensive areas of reasonably good and cheap land. Most of the desirable land in the North and East is now cultivated; but in the South less than one third of the surface is actually cleared for farming, and fully as much more is suitable for crops. Much of this unimproved land is cheap, as farm land goes.

Amount of cheap land

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Fig. 121. — An orange grove in Florida

Frosts are uncommon in Florida because of its southern location and the moderating influence of winds off the ocean and gulf. (See Fig. 112.) California greatly exceeds Florida in the production of oranges, but Florida leads in the production of grapefruit.

Bordering the Atlantic Ocean and the Gulf of Mexico, from Delaware Bay to the Rio Grande, is the Coastal Plain, as shown in Fig. 123. Near Chesapeake Bay it is only about seventy-five miles wide; but, as the map shows, it widens toward the south and west, includes all of Florida, and extends northward along the Mississippi River even to the mouth of the Ohio River. Notice how much of Texas it includes. This vast area is a low, flat plain that was once a sea bottom. As this was slowly elevated, it lost many of the materials that make fertile soil, as stated on p. 99. Some sections, like the parts marked Black Belt in central Alabama, and also in Texas, are remarkably productive, but the land in general is only moderately rich. Nevertheless, it is well adapted to many kinds of farming, and possibly seventy-five per cent of the area is still unimproved.

Location of cheap lowlands

Cutting across this Coastal Plain are numerous shallow river valleys that have very fertile bottom lands; the broad, flat plains bordering the Mississippi are also exceedingly rich. Point out these areas. On these bottom lands are many excellent plantations. There are likewise many swamps which, if drained, would rank among the most productive lands in the country.

West of the Atlantic Coastal Plain is a higher plain, called the Piedmont Plateau (Fig. 123), which has to a large extent been stripped of its forests and is now extensively cultivated. Note its location in the eastern portion of

Location of other cheap land

the Appalachian Highland. The soil here contains much more clay than that of the Coastal Plain and on that account allows a greater variety of crops. There are large areas of farm lands here that may be purchased at a moderate price.

The regions marked Southern Appalachian Mountains, Cumberland Plateau, and Allegheny Plateau are, in general, ill suited to farming, although they contain many small fertile valleys. The mountains here are higher than those in Pennsylvania, the highest peak in the entire Appalachian Highland being Mt. Mitchell in western North Carolina (6,711 feet).

Between the mountains on the east and the Cumberland Plateau on the west is the depression known as the Great Valley, much of which has limestone soil and produces excellent crops. More fertile still are the Blue Grass Region in Kentucky and the Nashville Basin in Tennessee. These two regions have soil that is as good as any in the world; it came from the weathering of a limestone that contains phosphate. In many parts of this limestone region, outside of the more fertile districts, much good land is available, and some large areas are only now beginning to be cleared of forests.

West of the Mississippi River, the Ozark Plateau resembles the Cumberland Plateau in its poor conditions for farming; but Oklahoma and western Texas are portions of the Great Plains and have soils similar to those of Kansas, Nebraska, and the Dakotas.

There is another opportunity for the farmer in the South as attractive as cheap land. That is the possibility of making the land more productive through improved methods of farming. Naturally men who do not own the land they cultivate are less interested than owners in keeping the soil, the buildings, the fences, and the farms as a whole in good condition; so that where there are many renters the yield of farm products is likely to be low. Moreover, in many sections the one main crop year after year has been cotton, only enough corn being raised to supply feed. This "one-crop" method has been kept up in many regions until the soil is nearly exhausted.

Possibility of making the Southern land more productive

1. Advantage of "mixed farming"

The progressive farmer has an excellent opportunity to reap profit by introducing improvements, for there are many things in his favor. The boll weevil has been in some

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Fig. 122. — Pineapples in Florida

The pineapple is a tropical fruit and does not do well in the northern part of Florida. The fruit with its tuft of leaves grows on a short stem and is harvested readily by cutting it free from the stem and lower leaves.

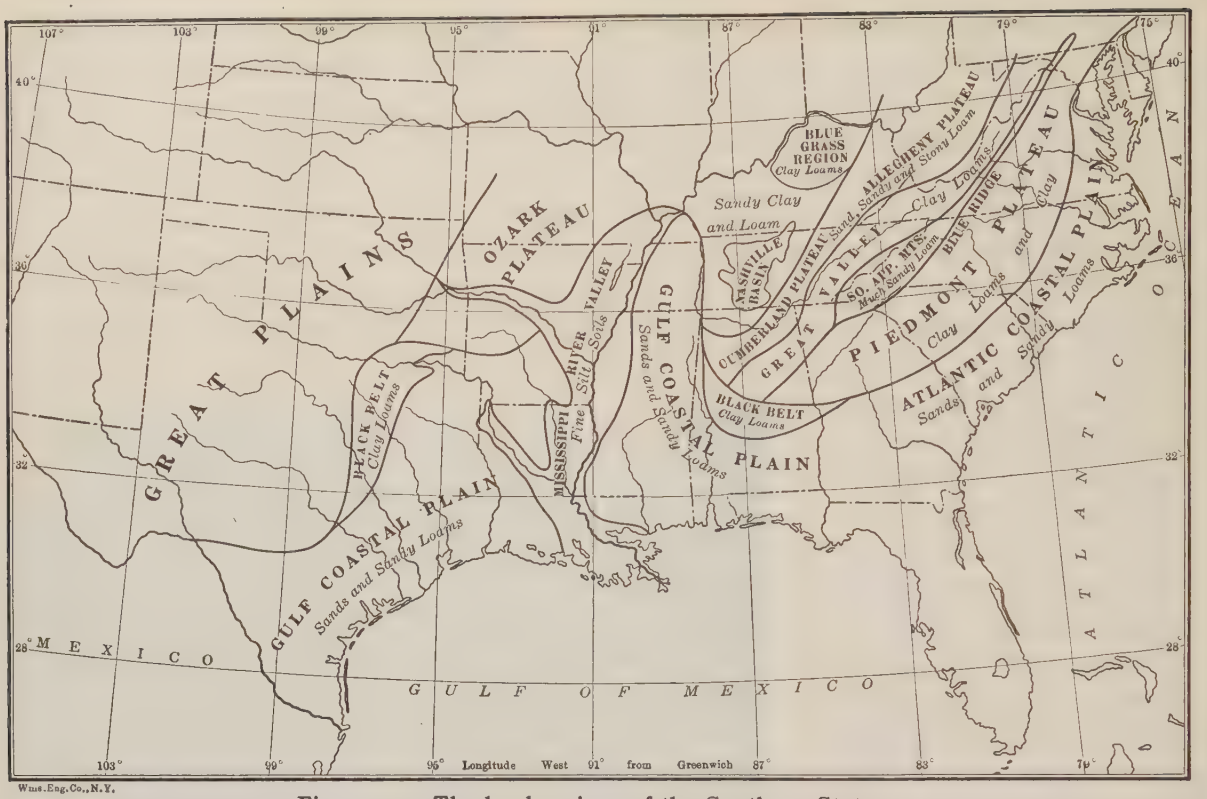

Fig. 123. — The land regions of the Southern States

respects a real blessing. It has destroyed so much cotton that many farmers have concluded it is not wise to trust to cotton alone for a living. In consequence they have planted other crops as well, and thus mixed farming is coming into fashion. The mixed farming opens the way for experiments of many kinds; and the greater the farmer's intelligence and enterprise, the greater his profit.

One important thing is to build up the worn-out soils, as well as to preserve those that are good. To this end soy beans, cowpeas, alfalfa, velvet beans, and peanuts are often cultivated; these crops also make it possible for each farm to raise more live stock. The peanut has already come to be a very important Southern crop, furnishing food both to man and to live stock. The fact that far more of natural fertilizer, in the form of rock phosphate, is found in the South than anywhere else in the United States is a great advantage. Florida produces the greatest supply, with Tennessee and South Carolina also yielding large quantities.

Fig. 124. — A log cabin at the top of Mt. Mitchell, North Carolina

This peak is the highest in North America east of the Rocky Mountains (p. 111).

2. Importance of using more machinery

The introduction of more machinery will not only relieve the farmer of much

Fig. 125. — Baling hay in the Blue Grass Region of Kentucky

The Blue Grass Region of Kentucky is a large basin in north central Kentucky covering about one fourth of the area of the state. Its soils, which come from the weathering of limestone, are among the most fertile of our country. A country home of the Southern type appears in the background.

drudgery, but will enable him to cultivate more land and thus increase his income. The value of machinery is well illustrated in connection with rice (p. 108). Since the outlook for rice is so promising, many farmers may specialize in that grain. It is important to know that, while the South is the greatest cotton producer of the world, only about one fifteenth of the Southern land well suited to cotton is now producing it.

It is evident that the Southern States have the climate and soil that will make them one of the great farming regions of the world. In the North there is less opportunity to increase the acreage of corn or wheat or other crops; or the number of swine and beef cattle. At least, a large increase in any one would mean a decrease in some of the others. In the South, however, owing to the quantity of unused land and to undeveloped methods of farming, any one product might be doubled or trebled without checking any of the others.

Fig. 126. — A country home in Texas

In some portions of Texas there are large plantations, with houses as beautiful as that in the picture. The large tree is a pecan. Pecans grow wild in some parts of the South, but in recent years large orchards of pecans have been planted.

Manufacturing in the South. — The low density of population, the abundance of cheap land, and the ease with which manufactured articles can be obtained from the North have discouraged any great development of manufacturing in the South. At present the South does only about one third as much manufacturing as the Northeastern States. During the period,

Its present rank in manufacturing

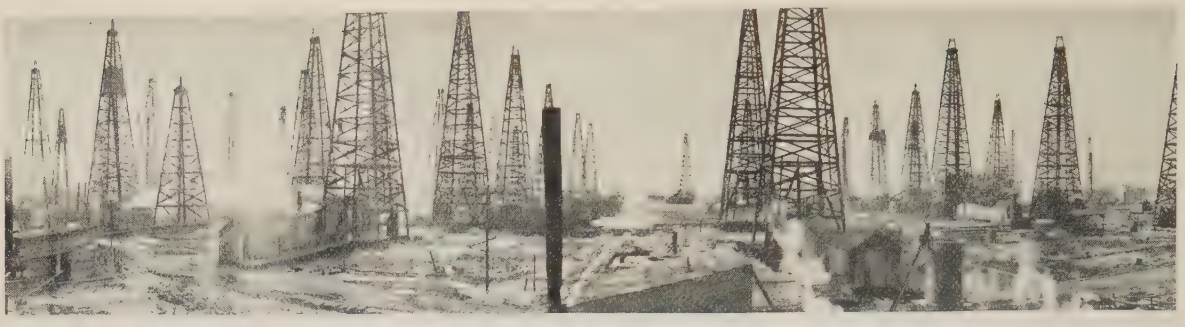

Fig. 127. — Oil derricks

The derricks were used in drilling the wells. In most wells the oil must be pumped to the

however, from 1900 to 1910 it doubled its output of factory goods, which suggests unusual advantages for manufacturing and a new energy and intelligence in that industry. Let us see what its opportunities are for further growth.

Its supply of power for manufacturing

1. Supply of coal

Fig. 4 shows that the principal coal beds of the North extend into these states. Which states are best supplied? Which have none? Locate the nearest sources of coal for the states that have none. What does this map tell you about the abundance of coal within the cotton area? Why is this a question of importance?

2. Supply of petroleum and gas

The United States produces more petroleum than all the other countries of the world combined; and about one half of our entire amount comes from the South. Five states there produce it extensively. Which are they? The most prominent are Oklahoma, Texas, and Louisiana.

a. How these materials were formed

Ages ago when the materials that later formed rock were being deposited on the ocean floor, countless animals and plants were imprisoned and deeply buried among them. These then slowly decayed, forming oil and natural gas. Thus these substances became stored within the earth. Oil of a similar kind is now manufactured from fish; and nearly the same kind of gas often rises from swampy places where plants are decaying.

b. How they are obtained from under the ground

The oil is found stored in sand at a depth of 100 to 3,000 or 4,000 feet below the earth's surface. The sand lies between layers of rock through which the oil cannot pass; and the pressure upon the oil is such that, when holes are drilled down to it, it rises toward the surface and sometimes even gushes forth. The yield per well varies from a few barrels per day to many thousands. The first well sunk in the vicinity of Beaumont, Texas, spouted forth oil in a six-inch column to a height of 160 feet, and yielded 75,000 barrels per day. Since oil is usually worth several dollars per barrel, one can imagine the excitement that followed.

Many of the oil derricks that are now seen in these states are quite new, showing that men are still actively boring for oil (Fig. 127). Numerous valuable wells have recently been discovered, and have had much influence in attracting settlers. Ranger, Texas, is an example of a city that has sprung up very rapidly near important discoveries of oil; and Wichita Falls, in the same state, owes much of its recent growth to the neighboring oil fields, as do also Tulsa in Oklahoma and Shreveport in Louisiana.

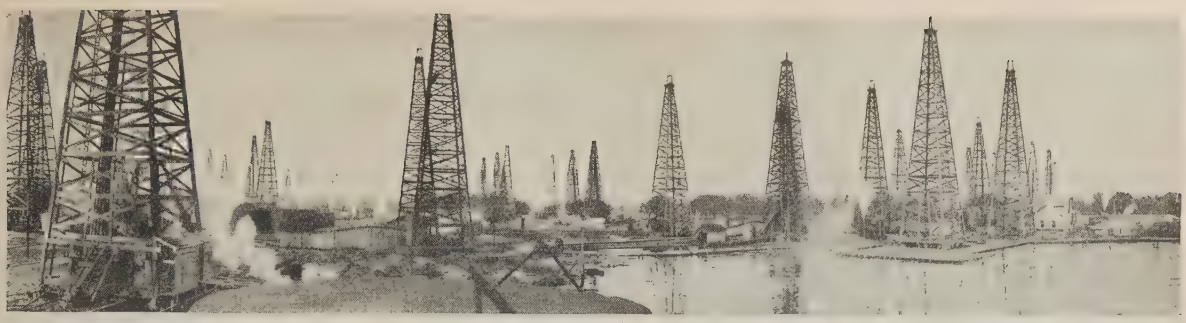

Photo by Frank G. Allen

in the Texas oil fields

surface; the small buildings in the picture contain boilers, engines, and pumps for this purpose.

Natural gas is often found in the same region as oil; both are very valuable as fuel for domestic and factory purposes.

3. Quantity of water power

The South has an enormous quantity of water power. The heavy rains produce many rivers. Because of their steep descent to the sea, many rapids and falls occur along their courses.

Water power is particularly abundant in the Southern Appalachian Mountains and the bordering Piedmont Plateau. Partly because of the importance of these mountains as the source of rivers, the United States Government has purchased many small areas in them for the purpose of preserving the forests, which tend to keep the flow of water in the rivers uniform. Name and count the states that contain and surround these mountains, and that can benefit from this power.

The other area well supplied with water power is nearer the coast. Along the eastern edge of the Piedmont Plateau, where the rivers drop to the Coastal Plain, is a series of falls extending all the way from Baltimore to Montgomery, Alabama. This is the Fall Line to which reference was made on p. 34. As one might expect, a large number of cities are located upon it (Fig. 112). Name the more important cities, and note the state in which each is located.

Water power has long been used in the South in the running of gristmills and sawmills. More recently dams have been built for cotton factories, and now there are more than 13,000 dams for the production of power. Most of the cities in and near the Appalachian Highland and on the Fall Line make extensive use of electricity produced by water power, both for light and for

Courtesy of Ranger Chamber of Commerce

Fig. 128. — Ranger, a new oil town in Texas

Wherever large deposits of oil, gold, or silver are discovered a rush of prospectors results and towns are built rapidly. Several oil derricks may be seen in the background. Ranger had less than 1,000 population in 1916; in 1920 its population was 16,000.

© Canfield and Shook

Fig. 129. — Richmond from the James River

The bridge is one of several that span the James River and connect the northern and eastern portions of Richmond. This city, by way of the James, has direct steamer communication with New York, Philadelphia, Baltimore, and other ports.

running factories and street cars. Yet only a small part of the possible water power has been brought into use.

What conclusion do you draw, therefore, about the future supply of power from coal, oil, and running water in the South for manufacturing?

Influence of the forests on manufacturing

For some years the South has led the forest regions of the United States in the production of lumber; it now has about 18,000 sawmills and produces about one third of the lumber of the country. Lumber in the South was first produced on a large scale in North Carolina. The Southern pine is the principal kind of tree found throughout the Coastal Plain. In the forests of North Carolina, tar, pitch, and turpentine were first produced in large quantities. These are obtained from the resinous sap of this pine, and are commonly called *naval stores*.

For many years Savannah was the leading port for the export of forest products. The lumbering has gradually moved westward, so that now the most active center for the industry is on the Coastal Plain of Louisiana and Mississippi. The hardwoods, such as oak, gum, chestnut, and hickory, are shown by Fig. 14 to come from the states farther north and west. West Virginia, Kentucky, Tennessee, and Arkansas now lead in the production of hardwood; Memphis in Tennessee is our leading hardwood center.

While production of lumber has been the chief manufacturing industry in the South, the forests are being so rapidly exhausted that its importance is likely soon to decline. Certainly many of the sawmills will cease to operate in the near future.

The manufacture of furniture and farm implements has reached no such proportions as in the North Central States (p. 92); it is nevertheless carried on extensively, and with the expected increase in population is likely to develop rapidly.

Influence of the farm products on manufacturing

We have seen what a stimulus the extensive farm products of the North Central States have given to manufacturing (p. 76). A similar influence is felt in the South. Cotton being the leading agricultural product, cotton manufacture ranks next to lumbering in importance. It is carried on most extensively on the Piedmont Plateau,

1. Influence of cotton

a. Extent of cotton manufacturing

where raw cotton and water power and coal are all at hand.

At one time almost all the cotton manufacturing in this country was done in New England; but the South has long done some spinning and weaving, and in recent decades has greatly increased the number of mills. Fig. 134, in which each dot represents one mill, suggests their number and also shows their location. Which states are in the lead? Compare Fig. 134 with Fig. 110 to find out whether cotton mills are most frequent in the most productive parts of the Cotton Belt.

The South does not attempt to manufacture the finer kinds of cotton goods, partly because it lacks the skilled labor that comes from long experience in this industry; but coarse cotton goods can now be manufactured more economically in the South than in New England.

The following facts regarding an Alabama cotton mill give some idea of the meaning of one of the little dots on the map. This particular mill employs 600 persons, including men, women, boys, and girls. Every workday this mill uses fifteen bales of cotton, weighing about 500 pounds each. Since the average yield per acre in most states is less than 200 pounds, you can easily estimate how many acres of cotton are grown yearly to supply this one mill. In this mill, as in many others, white people are employed to do the work.

Many of these mills are in the cities, as might be expected. Compare their location, as shown in Fig. 134, with that of the leading cities in the Cotton Belt. Many of the mills, also, are in the country; in such cases there are villages near by. Some of these mill towns are already so large that they have their own schoolhouses and churches.

Cottonseed was formerly thrown away or used as feed for stock, although there are about two pounds of seed to one pound of cotton, so that it forms a large part of the crop. It has now become very valuable, for it has been found that the oil which it contains can be made into many products. The better grade of cottonseed oil is used in making oleomargarine, cottolene, and salad oil, and as an imitation olive oil. Some is used in making soap, some for packing sardines, and some as a substitute for linseed oil in

b. Products manufactured from the cottonseed

Courtesy of Crosby-Chicago Adv. Agency

Fig. 130. — Timbers cut in the sawmills at Bogalusa, Louisiana

This mill can cut timbers as long as seventy-five feet for ships and bridges. What is the size of the long timber in the picture? At such large mills the logs may be sawed very economically. The waste of lumber at most small mills is from one third to one fourth of the log.

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Fig. 131. — A turpentine still

This apparatus is used to distill spirits of turpentine from crude turpentine. The crude turpentine is poured into the still, the upper portion of which is seen in the center of the open building on the left. This is heated by a fire in the furnace beneath and the turpentine passes off as vapor through the long crooked pipe into a coiled pipe surrounded by cool water, where it becomes a liquid.

© Publishers' Photo Service

Fig. 132. — Rosin on the docks at Savannah, Georgia

Savannah is still the greatest shipping point for naval stores in the South, although the naval-store industry has moved westward. This rosin will be shipped to various parts of the world, especially to the Northeastern States and Europe, there to be further refined. Rosin is used in varnishes, in giving gloss to paper, in making soap, and in many other ways.

paints. Even the part of the seed that is left after the oil is pressed out is valuable, making an excellent food for cattle, and a good fertilizer.

2. Influence of other farm products on manufacturing

The extensive cultivation of tobacco has led to tobacco manufacturing in a large number of Southern cities. The most important tobacco centers are Richmond, Lynchburg, Louisville, Durham, and Winston-Salem. One reason for the leadership of these cities in this industry is suggested in Fig. 105. What is it? The cultivation of sugar cane and rice leads to further manufacturing. Since New Orleans and other cities in Louisiana are near the cane and rice fields, much of the rice polishing and sugar refining takes place there.

© Bluff City Engraving Co.

Fig. 133. — A lumber-yard scene at Memphis, Tennessee

Memphis is one of our most important hardwood centers. Where does the hardwood come from?

As more land is brought under cultivation, and as the methods of farming are improved, the increased production

will, no doubt, result in a corresponding increase in manufactures. Dairying, meat packing, and many other industries will then become more prominent.

Influence of minerals on manufacturing

1. Bauxite

The United States leads the world in the production of aluminum, and all our bauxite — from which aluminum comes — is obtained from Georgia, Alabama, Tennessee, and Arkansas. Until recently the ore was shipped North for smelting and refining, but now there is a large plant for that purpose in Tennessee. The crude aluminum, however, is sent North for manufacture, the largest aluminum rolling and stamping mill in the world being located in northern New Jersey on the Hudson River. What articles can you name that are made of aluminum?

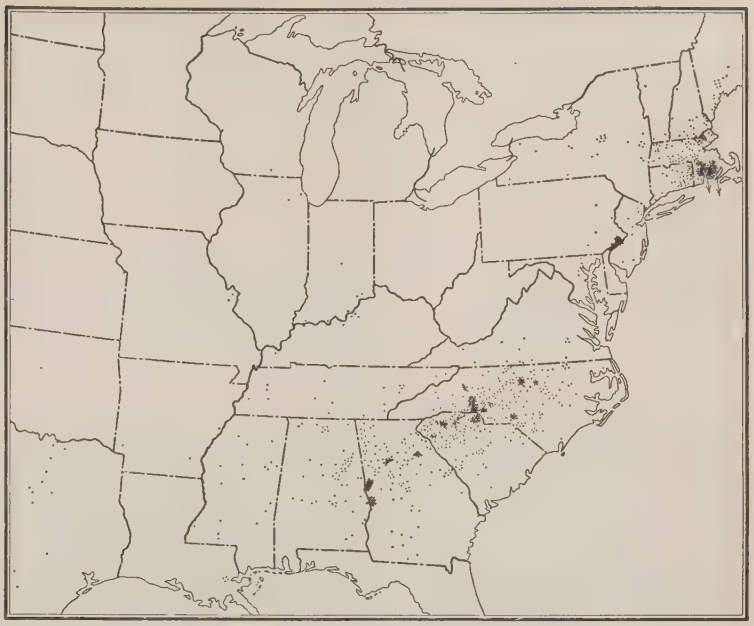

Fig. 134. — Cotton mills in the United States

Each dot represents a mill.

2. Sulphur

Sulphur is a very valuable mineral product used in making acids, in vulcanizing rubber, and for medicine and matches; many sulphur products are manufactured chiefly in the South. Until a few years ago most of our supply of sulphur came from Italy; but now it is obtained from Louisiana and Texas.

3. Iron Ore

Some copper is mined in eastern Tennessee; this mountainous area is also important for its iron ore. Fig. 4 shows where deposits of iron ore have been discovered in the South. Locate the principal points. Note that the Appalachian Highland is the only region in the South in which this ore is now extensively

Fig. 135. — Loose-leaf tobacco warehouse, Lexington, Kentucky

In the tobacco regions of North Carolina, Kentucky, and Tennessee there are loose-leaf warehouses in most cities and towns. The tobacco leaves when stripped from the stalk are graded and several leaves of the same grade are tied together to form a *hand*. The hands are piled up in circular piles as seen in the picture.

mined. The chief centers for iron and steel production are Birmingham, Alabama, and Chattanooga and Rockwood, Tennessee.

Birmingham has remarkable advantages as a site for the iron and steel industry. Coal, iron ore, and limestone are mined within a few miles of each other in that vicinity, which gives this region one distinct advantage over Pittsburgh and the other iron and steel centers of the North. Furthermore, it is near the Gulf ports of Mobile and New Orleans, and thus within easy reach of the countries of Central and South America.

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Fig. 136. — A blast furnace in the Birmingham district

There are about thirty blast furnaces in and near Birmingham, in addition to many steel plants making sheet steel, rods, nails, rails, and machinery.

Conveniences for transportation. — Fig. 11, as we have seen, shows what a large proportion of the navigable rivers of the United States are found in the South. Locate on Fig. 112 the Tennessee and Cumberland rivers; the Arkansas and Red rivers. Most of those on the Atlantic coast are navigable for only a short distance. Can you give the reason? If you do not see it, perhaps Fig. 112 will suggest it to you.

Importance of waterways

Before the days of railroads, these rivers carried great quantities of freight; but the railroads, as in the North, have now absorbed most of it. The most important river of all, of course, is the Mississippi; the part of it that carried the heaviest traffic in 1916 was the section between New Orleans and Vicksburg. Yet it carried in that year only 2,239,000 tons of freight, while 87,000,000 tons were carried through the Soo Canal (Fig. 99), and the Norfolk and Western Railroad hauled 31,000,000 tons of soft coal alone to the Atlantic seaboard. The rivers, however, still carry some freight and are always available for greater use if railroad rates become too high.

Reasons for the routes of the principal railways

Fig. 233 shows the trunk lines of railroad in the South. How do they compare in number with those in the North? What extensive areas lack railroads? Can you recall any reasons why they are wanting there?

Many of the roads run north and south, connecting the large cities in the grain and food producing sections of the North with the Southern ports, such as Houston and Galveston, New Orleans, Mobile, and Savannah. Trace some of these roads and find their names as indicated on the map. They haul farm products and manufactured goods southward for export to Central and South America or Europe, and carry tropical products and early vegetables northward.

Other trunk lines extend northeast, connecting the South with Washington, Baltimore, Philadelphia, New York, and Boston. Trace these lines and find their names. Knowing the products and needs of the Northeastern States, as well as those of the South, mention some of the most important kinds of freight that you would expect to be carried in each direction.

One of the leading railroad centers of the South is Atlanta, Georgia. Northeast of it for 500 miles there is no easy pass east and west across the Appalachian Highland; in fact until 1880 in all that distance no railroad crossed it. Atlanta, however, lies to the south of this highland, so that roads connecting the sections to the northeast and southwest, and those to the southeast and northwest, can come together at this point. Thus Atlanta has become an important rail center in much the same way as Chicago, except that in one case mountains have determined the direction of the roads, while in the other this has been done by water.

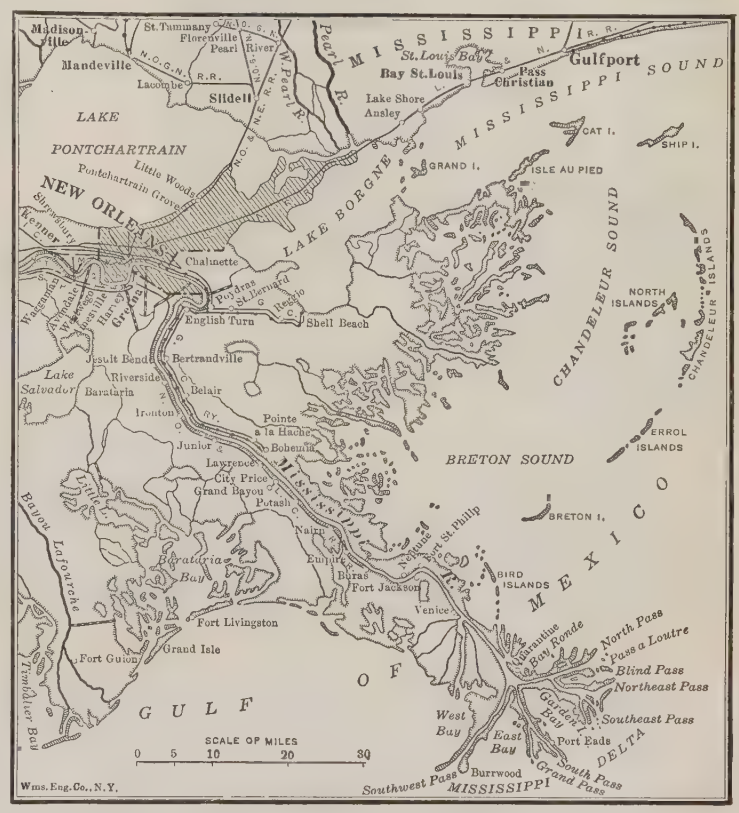

Fig. 137. — New Orleans and the Mississippi delta

Facts determining the importance of New Orleans. — New Orleans is located about 100 miles above the mouth of the Mississippi River. On the map (Fig. 137) you see that an arm of the sea, called Lake Pontchartrain, extends close to the river, and that the city is situated at the place where the river and the lake are nearest to one another. At this point the Mississippi makes a great bend in the form of a half circle or crescent, which explains why New Orleans is often called the Crescent City.

Reasons for its exact location

This particular site was selected partly because the sailing vessels of two centuries ago could reach it by crossing the lake, while they could not easily sail up the narrow river against the current. Below that point the land is too low and swampy for a city.

When we recall the advantages of New York City's connection by water with the West, some of the reasons for the growth of New Orleans become clear. Pittsburgh, Kansas City, and the Twin Cities can all be reached from it by water. Show the routes and name the rivers followed. Compare the distances with those from New York to Duluth

Advantages of this location for commerce

© Ewing Galloway

Fig. 138. — In the old French quarter, New Orleans

The paving stones were brought from the West Indies, having been used as ballast during the voyage. How can you tell that these are old buildings?

and to Chicago. Estimate the distance, also, from Pittsburgh to Kansas City.

These water connections led in early days to the rapid growth of New Orleans. As it grew, railroads were built to it, so that it is now one of the leading rail centers in the South. The railroads in its vicinity not only penetrate to various inland sections, but they also parallel the Mississippi and the other rivers.

Thus New Orleans is the southern gateway to and from the most productive valley in the world. Its location in the South corresponds to that of New York in the Northeast, and it faces the rapidly developing countries south of us just as New York faces Europe. Note how the Panama Canal has shortened the distance to the western coast of South America. Trace that route (Fig. 495).

The canal has shortened the route to our own western coast and to Asia, thus greatly improving the opportunity of New Orleans for trade with one half of the world.

With all these advantages, it is not surprising that New Orleans is the chief city of the South, and one of the leading markets in the United States for cotton, sugar, rice, coffee, and bananas. It likewise handles great quantities of tobacco, lumber, grain, nitrate of soda (p. 270), and other products. Can you explain the reason why these particular articles are prominent in its commerce? Name some goods that would be likely to be sent from New Orleans to Europe, and others that would be likely to be received in return. The city has greatly enlarged its harbor in recent years, and its commerce is rapidly increasing.

With all these advantages, why is not New Orleans a far larger city? It is less than one fourteenth the size of New York; and while in some years it ranks next to New York in imports and exports, it is a very poor second, having only about one seventh the foreign commerce of that city. How are such differences explained?

Some of the disadvantages of this location in comparison with that of New York City

There are several answers. In the first place, New Orleans is not now the principal gateway to and from the largest part of the Mississippi Valley; New York City has taken its place. Before the construction of the old Erie Canal and of the railroads, New Orleans was practically the sole outlet and point of entrance for this vast territory. Now New York and the other great Northeastern ports are the chief gateways for this region. Even West Virginia and Kentucky are now closely connected with the East by the Baltimore and Ohio, the Chesapeake and Ohio, and the Norfolk and Western rail-

roads. Trace their routes in Fig. 233 and note their terminal points. There is comparatively little of the vast Mississippi Valley north of Tennessee and Arkansas whose commerce is closely connected with New Orleans.

Again, New Orleans has important competitors in the South. West of it are the ports of Houston and Galveston, which handle a large share of the foreign and coast trade of Texas. Estimate their distance from New Orleans. A shorter distance to the east is Mobile, which serves as a port for the region to its north. Such competition on both sides leaves only a comparatively small area to New Orleans itself.

Finally, in facing South America rather than Europe, New Orleans suffers by comparison with the Atlantic ports. Compare Europe and South America in population (p. 477). Europe is the commercial center of the world, and on that account our ports that are nearest to it secure a vast trade. Nevertheless, New Orleans is assured of a very extensive trade in Southern products; for as the countries south of us increase in population, its commerce is sure to increase in like measure.

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Fig. 139. — The levee at New Orleans

Reasons for the small population of the other coast cities. — Next to New Orleans the largest coast city in the South is Houston. It is reached by a ship canal about fifty miles long, leading from Galveston Bay (Fig. 112). Note the situation of Galveston. These two cities make this portion of Texas by far the busiest shipping point in the South with the exception of New Orleans.

Importance of Houston, Galveston, and Norfolk

Remembering that these two ports are the principal outlet by water for the largest state in the Union and Oklahoma as well; that great quantities of rice, sugar cane, and cotton are raised in that region; that much oil is obtained not far away, as well as wool, hides, and meat from the ranches of western Texas, — you know the principal articles that are exported. What kinds of manufacturing would you expect in the interior cities of Texas and Oklahoma?

The third coast city in importance in the South is Norfolk, Virginia. Describe its location and note other cities near it. It has a fine harbor, and rail connection not only with other points in the South, but also with the Mississippi Valley, as stated on p. 122. What reasons can you suggest for its being one of the important coaling stations of the world?

Houston and Norfolk have each a population of between 100,000 and 150,000. Along the coast between these two there are, aside from New Orleans, a half dozen cities that contain more than 50,000 population. How many of them can you name and locate? There is not one, however, that reaches 100,000. Estimate the length of

Size of coast cities between Galveston and Norfolk, with explanation

Fig. 140. — Warehouses along

This canal, made by deepening and widening Buffalo Bayou, makes it possible for large ocean vessels to reach

coast line between these two points. In that great distance why are the cities all so small?

One explanation is the fact that there are so many that no one of them is a port for any very extensive territory inland from it. Paralleling the Atlantic coast is the Appalachian Highland, which for hundreds of miles presents a barrier to transportation. Estimate its distance from the coast. Because of this barrier, several of these ports can be gateways only for the territory between the mountains and the ocean. Name the cities that are limited in this way. In addition, as we have seen, a large part of the manufacturing for the area east and south of the mountains is located on the Fall Line (p. 115). Thus the coast cities are mainly shipping points rather than manufacturing centers, and are small because thus limited mainly to one occupation.

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Fig. 141. — Sea wall and beach at Galveston

Galveston is built on an island which is so low that, were it not for this sea wall, the city would be flooded in time of storm. This wall is made of reënforced concrete and is sixteen feet in height.

The contrast between North and South in location of chief cities.—The South forms a striking contrast to the North in the location of its chief cities. Of the ten largest in the North every one is on an important waterway, and most of them are on the

Lack of dependence of Southern cities upon waterways for their importance

Photo by Frank G. Allen

the Houston Ship Canal

Houston from the Gulf of Mexico. Note from Fig. 112 the importance of Houston as a railroad center.

Atlantic coast or the Great Lakes. Show that this is true.

The ten largest cities in the South, in the order of their size, are as follows: New Orleans, Louisville, Atlanta, Birmingham, Richmond, Memphis, San Antonio, Dallas, Houston, Nashville. Locate each of these. How many cannot be reached by water? How many are on water routes that, so far as you can judge from preceding statements (p. 124), are not extensively used for river transportation? Show the contrast with Northern cities in this respect.

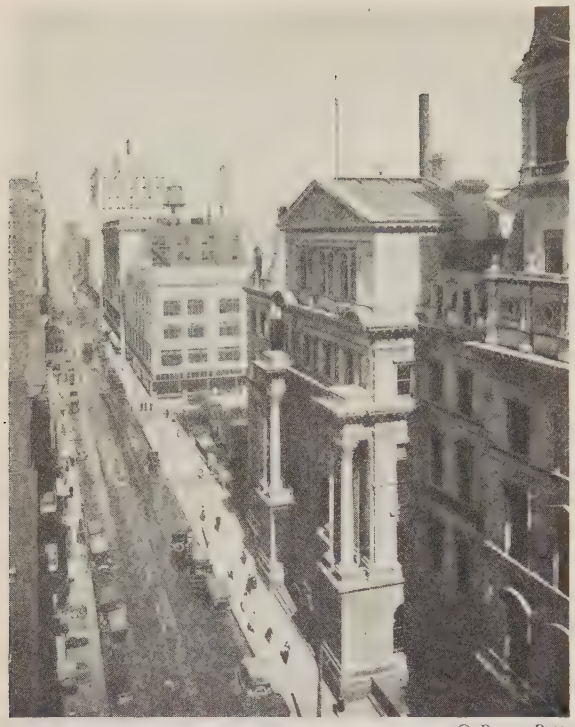
Causes of the growth of the river cities

Four out of the eight leading cities not reached by ocean vessels are on navigable rivers. These four are Louisville, Richmond, Nashville, and Memphis. Name and trace the river on which each is located.

While these rivers are of importance for transportation, other conditions have had far more influence on the recent growth of these cities. Richmond has abundant water power for manufacturing from falls in the river on which it is situated. Louisville is near fertile districts in which tobacco is one of the leading products. Both these cities are prominent tobacco markets and are engaged in extensive manufacture not only of tobacco goods (p. 118) but also of articles required in a rich farming country. Locate Louisville with reference to the Blue Grass Region of Kentucky.

Fig. 142. — The Alamo Plaza, San Antonio, Texas

The famous Alamo church, where a small body of Texans was wiped out by a greatly superior force of Mexicans in 1836, is seen near the end of the boulevard on the right. San Antonio is a city of many beautiful parks.



© Brown Bros.

Fig. 143. — In the business section, Louisville

Courtesy of Atlanta Chamber of Commerce

Fig. 144. — Office buildings in Atlanta

With the exception of some of our oldest cities, such as Boston, and of those built on hills, like San Francisco and Seattle, the downtown districts in most of our large cities are surprisingly similar in appearance. The streets are in general straight and laid out regularly, and many-storied buildings are frequent. Glance through the chapter on Europe (pp. 279–382) and note as many differences as you can between American and European cities.

Memphis and Nashville, convenient to the hardwood forests, are leading lumber markets; since the former is surrounded by cotton fields and the latter is in the rich Nashville Basin, both are likewise centers of trade with the neighboring farming districts. Memphis is the most important interior cotton market in the United States and manufactures great quantities of cottonseed oil; while Nashville is a flour-milling center.

© Manufacturers' Aircraft Assn.

Fig. 145. — An airplane view of Jacksonville, Florida

On what river is Jacksonville? This port in recent years has greatly increased its commerce. What products would you expect to be shipped from this port?

Important reasons for the growth of Birmingham and Atlanta, entirely independent of navigable rivers, have already been stated on pp. 120–121.

The importance of the four leading interior cities

Their location within the Cotton Belt is also an important factor. How must this affect their trade and manufacturing and consequently their population?

Dallas, Oklahoma City, and Little Rock, likewise without water transportation, owe their prosperity to the rich farming country about them. How near are they to the Black Belt of Texas? To the Cotton Belt? San Antonio is near a very important live-stock region, and also owes part of its prosperity to an extensive trade with Mexico. What other important centers, though smaller, do you see in Texas and Oklahoma (Fig. 112)?

Courtesy of U. S. Forestry Service

Fig. 146. — Hauling logs to the mill

The hauling of logs in the South is not so easy as it is in the winter in Maine or the Great Lakes region. Can you tell why?

Facts to be especially well fixed. — 1. Location of each of these states. 2. Of the leading interior cities. 3. Of the leading ports. 4. Character of the surface. 5. Climate: the distribution of rainfall and the temperature regions. 6. Principal farm products, and where each is grown. 7. Location of coal and petroleum. 8. Of iron ore. 9. Chief kinds of manufacturing. 10. Kinds and locations of forests. 11. Names and location of leading water routes.

Problems for independent study. — 1. Why have immigrants from foreign countries generally gone to the North and West rather than the South? Why has our own population tended to move westward rather than southward? *Lessons in Community and National Life*, Series C, Lessons C–27, C–31; Series B, Lesson B–24 (Department of Interior, Washington, D. C.); Commons, J. R.: *Races and Immigrants in America* (Macmillan); World's Work, vol. 6, p. 4021. 2. Write some advertisements that might attract immigrants to the South. 3. Make a sketch of the Southern States, showing state boundaries and principal rivers, mountains, and cities. 4. In how many ways are peanuts valuable? Carpenter, F. G.: *North America*, pp. 101–103 (American Book); Chamberlain, J. F.: *How We Are Fed*, pp. 199–200 (Macmillan). 5. Find how our government has aided in fighting the boll weevil. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 56–57 (Ginn); Sanderson, E. D.: *Insect Pests of Farm, Garden, and Orchard*, pp. 261–272 (Wiley); Conradi, A. F., and Thomas, W. A.: *Farm Spies*, pp. 1–22 (Macmillan). 6. What other enemies has cotton? See same references as for question five. 7. Compare the method of obtaining maple sugar with that of obtaining cane sugar. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 68–72, 77–79; Carpenter, F. G.: *North America*, pp. 89, 146–150; National Geographic Magazine, 1920, vol. 38, pp. 24–30; McMurry, C. A.: *Type Studies from the Geography of the United States*, pp. 209–217 (Macmillan). 8. Make a drawing of the typical sugar plantation described in the text, showing buildings, fields, and railroads as you imagine them. 9. Make a clay or sand model of the Southern States, and show sections where there is good and cheap land. 10. In what ways does the Appalachian Highland affect the geography of the South? Mill, H. R.: *International Geography*, pp. 715–718 (Appleton); Adams, C. C.: *A Textbook of Commercial Geography*, pp. 16,

54, 122–123 (Appleton); McMurry, C. A.: *Larger Types of American Geography*, pp. 1–36 (Macmillan). 11. Nashville is an important center for education. Find what educational institutions are located there. 12. Here is a question for debate: *Resolved*, that our government should charge a high enough tariff on all imported sugar to make the cane-sugar industry of the South profitable. National Geographic Magazine, 1916, vol. 29, pp. 66–69; McMurry, C. A.: *Type Studies from the Geography of the United States*, pp. 209–217. 13. Why must the reclamation of swamp lands usually be undertaken by the government or by large corporations rather than by individuals? *Lessons in Community and National Life*, Series B, p. 109 (Department of Interior, Washington, D. C.); Tarr, R. S.: *New Physical Geography*, pp. 167–170 (Macmillan). 14. The flood plains of the Mississippi River have at least two and one half times the area of the Nile River flood plains. How many people would they support if they were as thickly populated as the latter (p. 480)? 15. Make as full a list as possible of articles manufactured from aluminum. *Encyclopedia Britannica*, vol. 1, pp. 771–772; Van Hise, C. R.: *The Conservation of Natural Resources in the United States*, pp. 94–95 (Macmillan). 16. Write a composition showing the possible future of fishing in the South. National Geographic Magazine, 1916, vol. 29, pp. 546–583; vol. 35, 1919, pp. 476–488; vol. 37, 1920, pp. 369–386. 17. Find how the mouth of the Mississippi River is kept deep enough for large ocean vessels. Mill, H. R.: *International Geography*, p. 749; *Encyclopedia Britannica*, under the title *Mississippi River*. 18. Consult the magazines for the year 1900 to learn about the disaster at Galveston that made it necessary to construct the expensive breakwater shown in Fig. 141. 19. In what ways are the North and South dependent upon each other? 20. On an outline map indicate the chief agricultural, lumber, and mineral regions of the South.

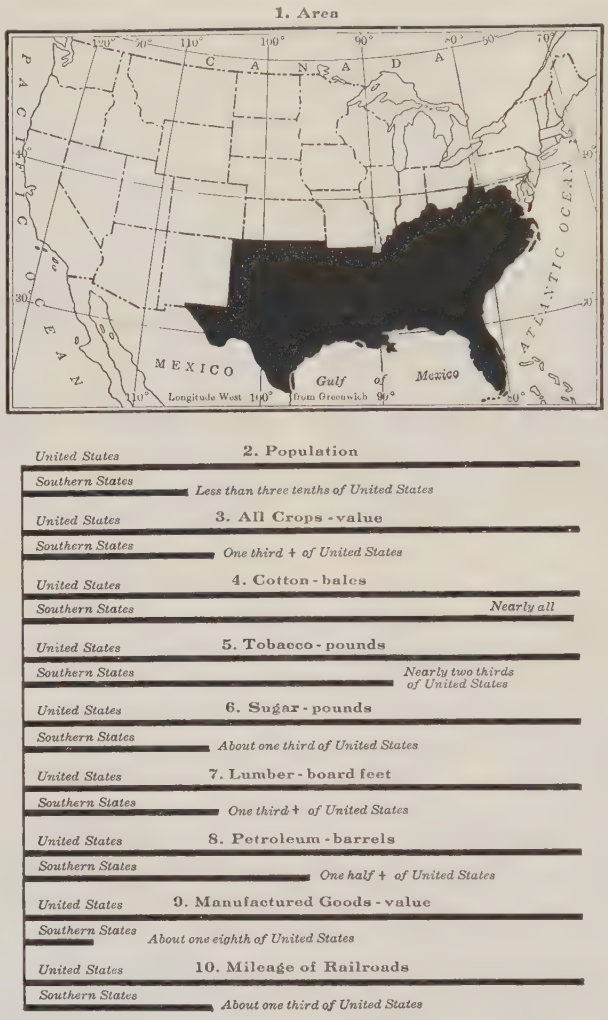

1. Area
PACIFIC OCEAN
CANADA
MEXICO
Gulf of Mexico
ATLANTIC OCEAN
Longitude West 100° from Greenwich 90°
United States
2. Population
Southern States
Less than three tenths of United States
3. All Crops - value
One third + of United States
4. Cotton - bales
Nearly all
5. Tobacco - pounds
Nearly two thirds of United States
6. Sugar - pounds
About one third of United States
7. Lumber - board feet
One third + of United States
8. Petroleum - barrels
One half + of United States
9. Manufactured Goods - value
About one eighth of United States
10. Mileage of Railroads
About one third of United States

Fig. 147. The Southern States compared with the entire United States

How to get help from friends in your study. — People are one of the best sources of information. One can frequently learn more by talking with a well-informed person than by reading. When you desire to secure information in this way, first consider who in your neighborhood is most likely to be able to help you with it. If it is only one fact that you need, you may perhaps get the answer by a single question. But often a longer conversation will be necessary; this should be planned in advance with some care. You ought to prepare several questions and test them to see whether they call for just the information that you require. When the interview takes place, you should stick closely to your subject until you have accomplished your purpose. Often it is advisable to take a few notes during the conversation; paper and pencil should, therefore, be at hand. After the conversation, think it over and write out the leading thoughts or facts obtained.

4. The Western States

State	Area in Square Miles	Population (1920)	Largest City	Population (1920)
Arizona	114,000	334,000	Phoenix	29,000
California	158,300	3,427,000	Los Angeles	577,000
Colorado	103,900	940,000	Denver	256,000
Idaho	83,900	432,000	Boise	21,000
Montana	147,200	549,000	Butte	41,000
Nevada	110,700	77,000	Reno	12,000
New Mexico	122,600	360,000	Albuquerque	15,000
Oregon	96,700	783,000	Portland	258,000
Utah	85,000	449,000	Salt Lake City	118,000
Washington	69,100	1,357,000	Seattle	316,000
Wyoming	97,900	194,000	Cheyenne	14,000

Questions. — 1. The two most sparsely populated states in our country are contained in the above list. Which are they? 2. Two of our three largest states (in area) are in this list. Which are they?

Density of population of the West compared with that of the other sections of the United States. — In the population map of the United States (Fig. 16), the West is seen to have few inhabitants in comparison with the East, the South, and the Middle West. In Fig. 148, it is easy to compute the population of most of these states. What surprising facts do you find, in comparison with the states east of the one-hundredth meridian? How does the population of all eleven states combined compare with that of New York or Pennsylvania?

The small population is not due to smallness of area, because this group of states is much larger than any of the three groups already studied; in fact, it contains about two fifths of the entire area of the United States. These eleven states average more than 100,000 square miles each, as you can discover for yourself by examining the figures at the beginning of this section; this is twice the average for the thirty-seven other states. The population of this group

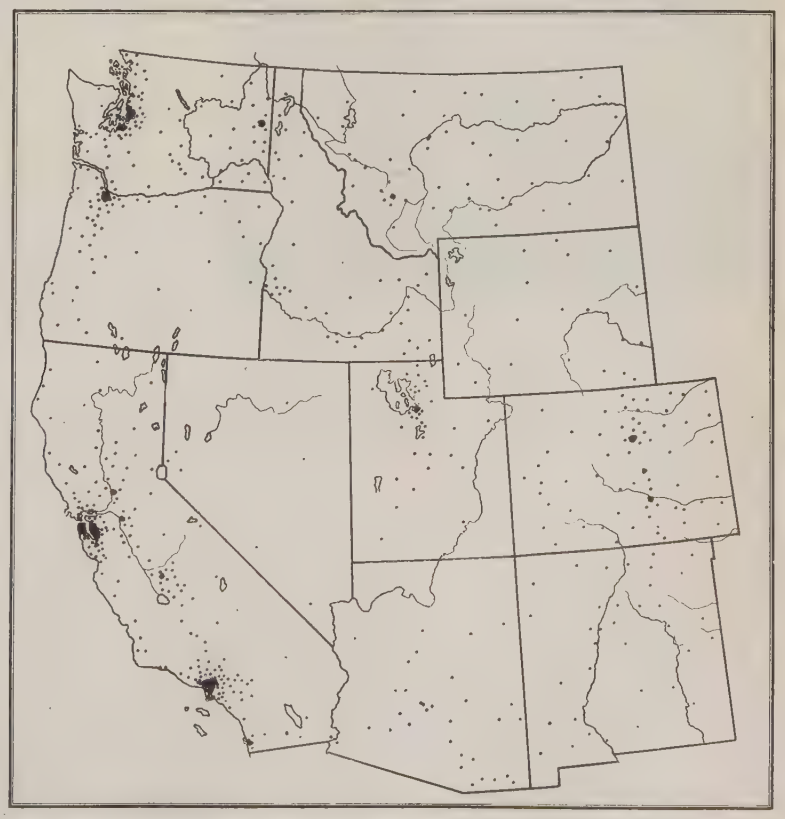


Fig. 148. — Distribution of population in the Western States

of states is thus seen to be much less dense than that of any other section of the country. This is partly because the entire width of North America lies between them and the older settlements along our eastern coast. It is in large measure, however, due to the fact that, throughout a large portion

© Ewing Galloway

Fig. 149. — An irrigated area near Tucson

Locate Tucson. This view shows how the scrubby vegetation of the semi-desert is replaced in irrigated areas by luxuriant crops. Note the large cactus in the foreground and the regular outlines of the tilled fields in the background.

of this section, lack of rainfall presents obstacles to agriculture that are not encountered elsewhere in the United States.

Why the population is so unevenly distributed. — Even within this group of states, moreover, there are striking differences in density of population. This is chiefly due to differences in rainfall. Ordinary farming, where special methods are not adopted to conserve moisture, cannot be carried on with much less than thirty inches of rain. Fig. 18 shows that the rainfall over most of this section is considerably less than that. Portions of three states, however, receive more. Which are they? How many receive less than twenty inches over the greater part of their surface? Which have large sections that receive less than ten inches? Such land is desert or semi-desert. Observe the fact that the Western States include both the most arid and the most humid regions of the United States. By comparing Fig. 18 with Fig. 148, note the effect of rainfall here upon population. Important exceptions to the rule that the most densely populated regions are the best watered occur in the case of irrigated areas and mining districts.

Early in our history small but prosperous agricultural settlements were scattered along the Pacific coast at points where the mild temperatures and luxuriant vegetation tempted the explorers to remain. The travelers who first ventured into the arid interior, however, came from the East and, being accustomed to plenty of rain, naturally reported it to be a desert. The first farmers, also, who attempted to raise crops in the arid area met with many failures.

Explanation of the uneven distribution of rainfall. — Rain, or lack of it, must be accounted for by the direction of the winds, for they are the water carriers of the earth. The prevailing winds for this section blow from the west; and as they cross the Pacific Ocean they gather up immense volumes of water in the form of vapor. As they travel onward over the land they drop this load only when they are compelled to do so. The first land they encounter is a series

Effect of the Coast Ranges on the rainfall

Photo by A. M. Prentiss

Fig. 150. — A scene along the Columbia River Highway

This building, called Vista House, was built to the memory of the pioneers who early settled the Oregon Country. It is a rest house for visitors on the Highway.

of comparatively low mountain ranges, called the Coast Ranges, that extend along most of our western coast. Trace them on the map. The air is forced to rise in order to pass over these mountains; this causes it to become cooler, and as it cools off some of its vapor is condensed and falls in the form of rain or snow. Fig. 18 shows that the winds lose much more moisture along the northern half of the coast than along the southern half. This is chiefly because in the southern half they blow only in winter. Why California has little rain except in winter is explained on p. 236.

Effect of other mountains on the rainfall

As the air descends on the east side of the Coast Ranges it becomes warmer, and there is much less rain. These winds then, after crossing a narrow valley from 50 to 200 miles in width, reach a much higher system of mountains called the Sierra Nevada in California and the Cascade Range in Oregon and Washington. They are here forced to rise much higher than before in order to pass over, and are therefore cooled still further and continue to drop, or *precipitate*, their moisture. For this reason the Pacific slope, particularly the northern half, is well adapted to humid farming and is an area of abundant and varied crops and of immense forests.

Then the air descends on the east side of these mountains and travels onward for hundreds of miles, until it reaches the Rocky Mountains. There are only scattered mountain heights on the vast plateau that it crosses here, and for this reason it now gives up little moisture. But the Rockies are in

many parts fully as high as the Sierra Nevada and the Cascades, with the result that they receive a moderate amount of rainfall as the winds pass over them. This rainfall, however, is not so heavy as that in the coast states, because the winds have already lost a large part of their vapor on their long journey. Yet the fact that it is considerable

Photo by Asahel Curtis

Fig. 151. — Mt. Rainier (Mt. Tacoma)

If we consider net elevation above its base, this is the highest peak in the United States. In basins about the peak are twenty-eight glaciers, covering in all forty-eight square miles. On the lower slopes of the mountain are dense coniferous forests. The district surrounding this peak, which contains some of the most beautiful scenery in America, is a national park (Fig. 175).

is shown by the number of large rivers that rise in these mountains. What sources of rivers do you find here? What is the rainfall on the mountains in Colorado (Fig. 18)?

The westerlies then pass on beyond the Rockies. As they descend over the Great Plains they constantly become warmer, gathering up moisture instead of letting it fall. This region is therefore semi-arid.

How mining has developed the West. — The discovery of gold in California in 1848 advertised the West as a region where quantities of that metal and perhaps of others might be obtained, and a mad rush of men from all parts of the world to that section followed. The search that was then begun has continued ever since; and many valuable deposits of gold, silver, copper, lead, zinc, and other metals have been discovered.

Abundance of metals in these states

These metals are usually found united with other elements and with rock, the mixture, as in the case of iron (p. 37), being called ore. Considerable *native*, or pure, gold, however, is found in rocks or in gravel washed from the rocks. In some cases hot water has helped to collect the metals along cracks and pockets in the rock, so that they are easier to find than they otherwise might be. For example, there have been many volcanoes in these states; and the water that has passed off from the volcanic rock has often been so hot that it dissolved mineral matter found in its course and carried it along in solution. When the water cooled, it could no longer hold such matter, and so deposited it on the walls of the cracks through which it passed. These deposits are called *veins* of ore; in mines, the tunnels follow these veins.

The men who search for the ores are called *prospectors*. The Government owns much of the Western land, and all ore found upon

government land belongs to the finder. Thus any citizen of the United States may become the owner of a rich mine if he can discover one on government land. In some parts of the West the traveler can see from the car window scores of little tunnels leading into the mountain sides, which have been dug by prospectors. It is a hard, lonely life that such men lead, and most of them get little reward; but occasionally one discovers a vein and becomes a rich man. Many groups of men have formed mining companies with large capital and established valuable mines. As a result, every one of these states is noted for minerals, and mining is one of the leading occupations in all of them.

How the ores are found

The first method of obtaining gold consisted in scooping panfuls of sand, gravel, and water from stream beds and in rotating the pan in such a way that the water and gravel were spilled out. The gold, being several times heavier than the water or the gravel, settled during the process to the bottom of the pan. *Panning*, as this process is called, is the crudest form of *placer* or surface mining. Do you see how the expression "pan out" originated in this method? What does it mean now?

Methods of obtaining the metal

1. How it is obtained from gravel

This method was too slow, however, for extensive operations, and several improvements upon it were soon devised. The *cradle*, or *rocker*, resembling a child's cradle, took the place of the pan. This, also, proved too slow, and ore-bearing gravel was shoveled into steeply sloping troughs, or *sluices*, that had cleats across the bottom. Water was used to carry the gravel over the cleats, and the gold, being so much heavier, settled to the bottom and was caught behind them. Finally powerful streams of water from hose or pipes were directed against banks of gold-bearing gravel, which was washed directly

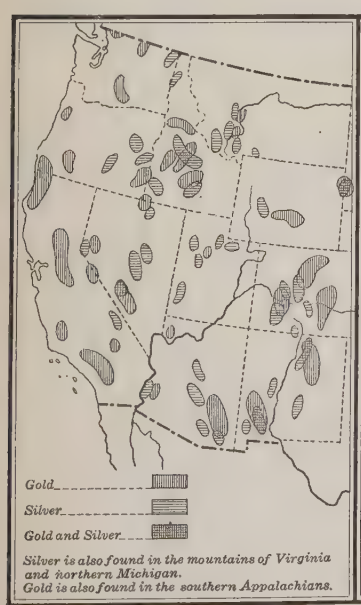

Gold
Silver
Gold and Silver
Silver is also found in the mountains of Virginia and northern Michigan.
Gold is also found in the southern Appalachians.

Fig. 152

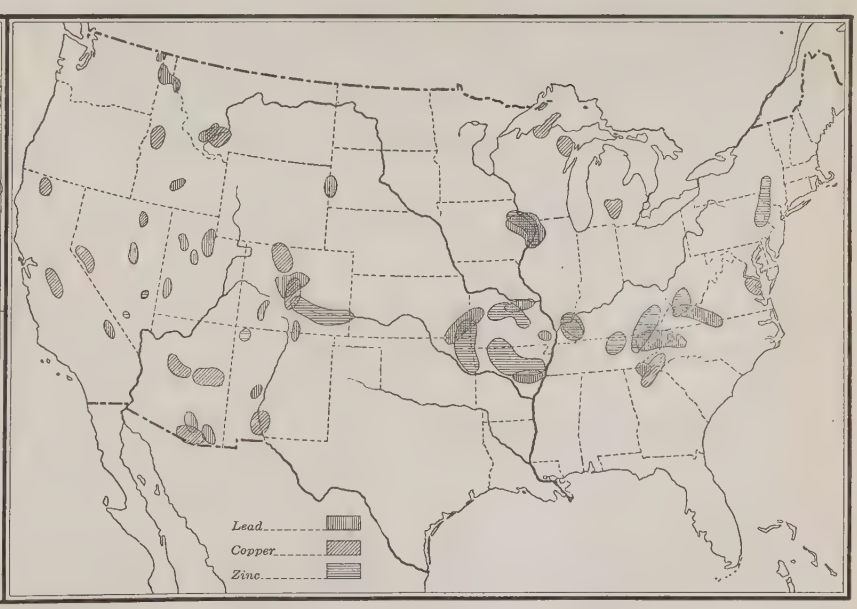


Fig. 153

Note the fact that the most valuable deposits of the precious metals are found in the Western States. Of the five metals shown, which is most widely distributed?

into the sluices. This is called *hydraulic* mining. The gravel from which some of the streets of Helena, Montana, are built was washed for gold in this manner. The abundance of water in many sections, especially among the mountains, favored this method.

The richer discoveries of gold-bearing gravel were soon exhausted, however, and it became necessary to wash gravels of lower grade. For this purpose floating *dredges* are now in use in many places, especially in California, where the streams emerge from the mountains into the interior valley. These scoop up great quantities of gravel with heavy machinery and wash it very thoroughly.

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Fig. 154. — The Bell Mine in Butte

Butte is one of the greatest copper centers in the world. While copper is the chief ore mined there, silver, lead, gold, and zinc ores are also found. The prosperity of Butte, like that of all copper-mining centers, varies with the demand for its product.

The gold obtained in gravel banks probably came originally from veins of ore. At the present time most metals are found by digging into solid rock for such veins. This is called *drift* mining. The general plan of a gold mine of this type resembles that of the coal mine represented in Fig. 23.

2. How it is obtained from veins

Since the tunnels that are dug following the veins may be hundreds of feet below the surface of the ground, their walls are subject to intense pressure from above. On that account they are in danger of caving in or of having heavy rocks fall from their roofs. To overcome these dangers, powerful timbers in an upright position line both sides of the tunnels and support crosspieces overhead. A single mine frequently contains miles of such tunnels, and thus requires an enormous amount of timber.

Dependence of certain cities upon mining

1. Of cities where mining is carried on

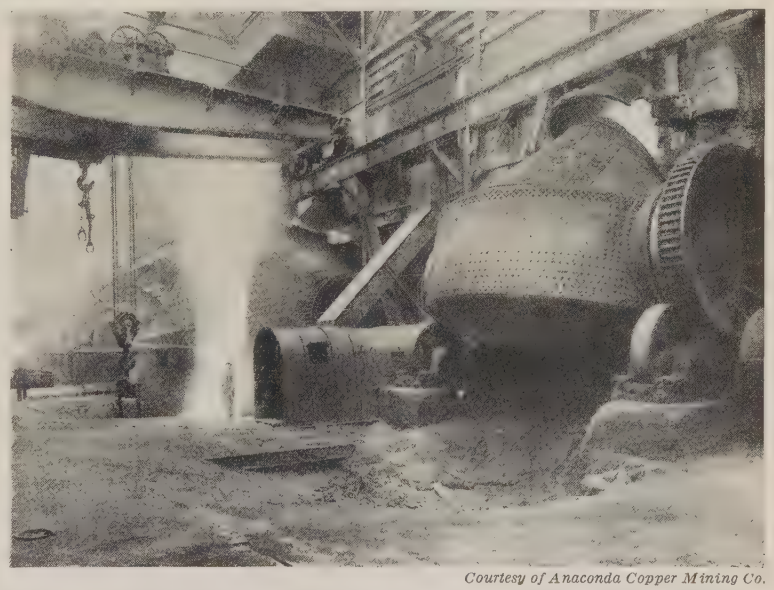
With such an abundance of valuable ores, it is not surprising that many of the towns and cities in the West are chiefly interested in mining. By comparing Fig. 153 with the map (Fig. 175), you can see what metals are found in or near important towns. One of the best examples of such a community is Butte, Montana. Its principal metal is copper, although Fig. 153 shows that other metals are obtained in that vicinity. Many of the mines lie beneath the city itself, and others are close by, so that thousands of men living there work underground every day. The transportation of the ore to the cities where it is smelted gives employment to hundreds of others. Still others help to provide the timber and machinery used in the mines, and the food and clothing required by the miners and their

families. In Arizona, Bisbee, near the Mexican border, is another mining center, the Copper Queen mine there being one of the largest copper mines in the world. Bingham, Utah, is another. Leadville and Cripple Creek in Colorado are still others; and there are many more. What metals, according to Fig. 153, are mined near the two places last named?

Other cities more remote from the actual mines are centers for refining the ores. In some cases the metals are extracted by crushing the ores in mills, called *stamp mills*, and then using chemicals. In other cases the ores are dumped into blast furnaces and the metals extracted by *smelting*.

2. Of cities where ore is refined or supplies are obtained

Anaconda, twenty-seven miles from Butte, has the largest copper smelter in the world, and smelting is its chief industry. Denver and Pueblo are two others. The ores are hauled to these cities, which are also trade centers for the mining districts. Name five metals that are obtained from the mountains near these cities. Great Falls, Montana, is a similar center. So also is Salt Lake City, for an unusual variety of mineral products is mined in its vicinity, the output of copper being especially valuable. What metals are mined in the vicinity of each of these cities?



Courtesy of Anaconda Copper Mining Co.

Fig. 155. — The interior of a great copper smelter at Anaconda, Montana

Native copper like that obtained in the Lake Superior region is easily prepared for market, but if copper is united with sulphur, iron, arsenic, and other substances the pure copper is difficult to obtain and the ore must pass through a long and complicated process. Ore of the latter kind is common in our Western States.

The dependence of the West upon irrigation. — Mining and the refining of ores could not flourish as they do, if a large amount of food were not produced in the West. On the other hand, agriculture could not have flourished as it has if the extensive exploration of this section for mineral wealth had not shown its varied possibilities for food production. Men soon discovered that the West is divided naturally into land regions that are very distinct from one another, each of which is peculiarly fitted for certain human occupations (Fig. 157).

How a study of the land regions reveals the need for irrigation

The Great Plains region, already described on p. 69, is a high, semi-arid plateau well suited to grazing but not suitable for agriculture except when special methods are used to save moisture. Beyond this region, from New Mexico northward to the Canadian boundary, is the Rocky Mountain region, where the rainfall is in places sufficient, but the land too rough, for agricul-

ture. Both mining and grazing, however, flourish here. Still farther west is the great arid area, divided, as the map shows, into three fairly distinct plateaus. Name them. Here agriculture is usually impossible without irrigation. Next we find a narrow belt of lofty mountains, well watered and densely forested. Name it. Beyond these mountains, occupying at least some portion of each of the three Pacific coast states, are long strips of very fertile lowland. That which extends southward from Puget Sound receives abundant rainfall and is level enough for cultivation, but lacks the summer heat necessary for certain important crops; the Valley of California is, on the other hand, extremely productive, yet in general requires irrigation because of the lack of summer rains. The Coast Ranges, which lie beyond, are well watered except in the extreme south. Their principal product is lumber.

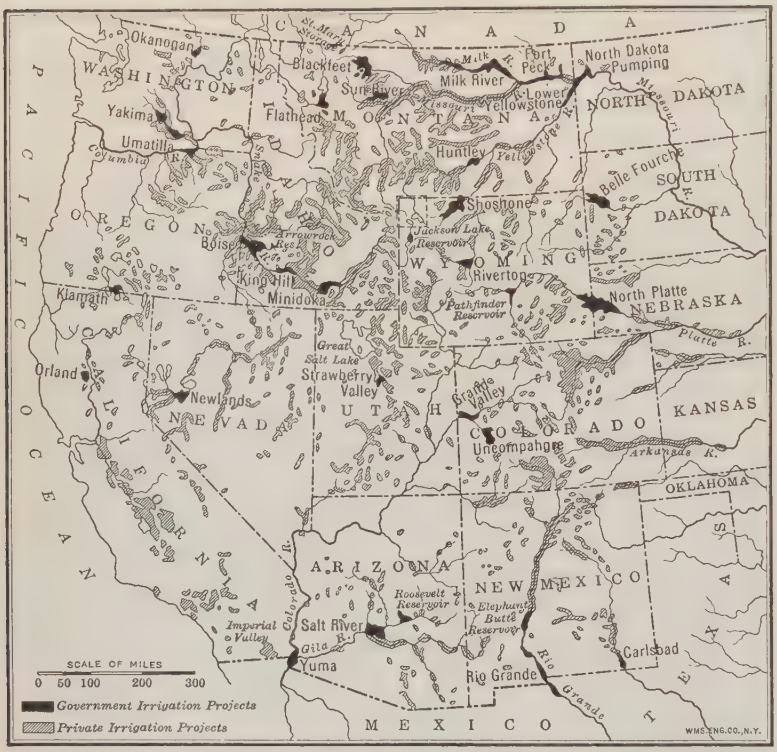


Fig. 156. — The irrigated areas in the West

Compare this map with Fig. 18 to see why irrigation is necessary in these areas. The entire area of irrigation projects is shaded, even though water is not yet applied to their whole extent.

The actual area available for agriculture by ordinary methods is very small indeed, for in regions that have sufficient rainfall the surface is usually too uneven. The necessity for using more than this small fraction of the surface of these states thus gave rise to a serious problem. The chief solution is *irrigation*, which has made it possible to grow an astonishing variety of food products in this section.

How irrigation projects are planned

Many of the irrigated districts have been planned and controlled by individuals or private corporations; but since 1902 the United States Government has taken a very active part in establishing irrigation systems. It has, in general, handled the more difficult projects; for most of the land that could be brought under irrigation easily and cheaply had already been taken up privately.

Extent of irrigation in the West

There are now thirty-one government irrigation projects in the West, including the arid portion of the Middle West. Fig. 156 shows how these are distributed. Some are far east of the Rockies on the Great Plains, as, for example, the North Platte Project in Nebraska. Others are in the mountain valleys and on the plateaus. Two adjoin Mexico,

and several are near the Canadian boundary.

The same figure shows the relative area of irrigated lands due to private enterprise. How does this amount compare with that made available by the government?

Colorado leads in the quantity of irrigated land, having nearly 3,000,000 acres. California is second and Montana third. All together the irrigated lands include about 14,000,000 acres. How many square miles is that? You can compute for yourself what a small fraction it is of the entire area of these states.

While the portion is small, it should be kept in mind that irrigated land is much more productive than ordinary land. Irrigated fields are much more intensively cultivated than others. They are expensive to start with, but every square foot can be well watered, and farmers therefore plan to get the fullest possible returns. The yield per acre is more valuable than that of any other farm land in our country.

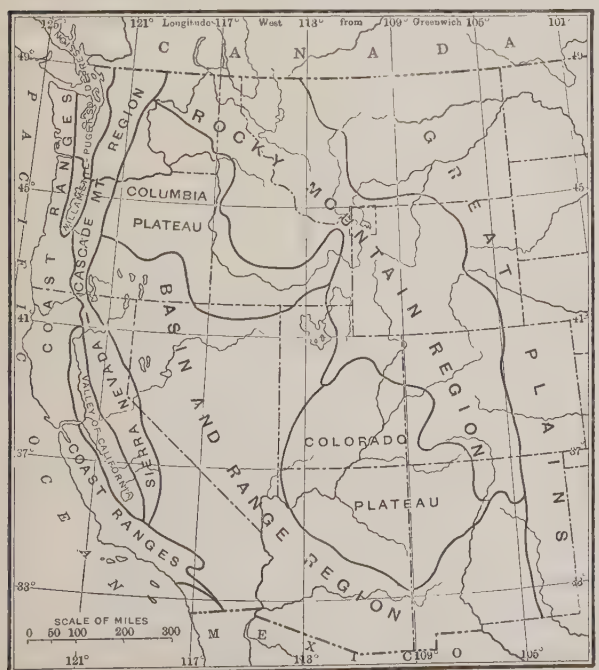


Fig. 157. — Land regions of the Western States

Courtesy of U. S. Reclamation Service

Fig. 158. — An orchard in blossom in the Grand River Valley Project

This irrigated region is famous for its apples and peaches. One can see in this picture how carefully the orchards are cared for. The row of iron boxes on the right are smudge boxes used for making a dense cloud of smoke to protect the orchard from frosts.

A typical irrigation project

1. Its source of water

How our government undertakes irrigation is illustrated by the Minidoka Project in south central Idaho along the Snake River (Fig. 159). The Snake River rises in the mountains of western Wyoming and eastern Idaho and flows southwestward and then northwestward to the Columbia River. The high Teton Range in western Wyoming, the most important mountains at the headwaters, receives heavy snows and rains; and the many glaciers, mountain lakes, and forests in this region tend to regulate the flow of water so that it is reasonably uniform throughout the year. After leaving the mountains the river flows through a plain that slopes gently on both sides toward the stream.

The soil is extremely fertile, some of it consisting of broken up, or *decomposed*, lava. There are numerous falls in the rivers and at places deep canyons. The sky in general is clear, the air bracing, and the region healthful. This plain is a promising location, therefore, for an irrigation project.

One of the first things to be done was to make a survey of the river sources to determine how much water would be available if the spring floods could be stored. Another survey was made to find how much land in the valley could be reached through irrigation, for it was necessary that the land should lie at such a level that water from the main stream, above the dam, could be run over it with the least possible amount of pumping. It was learned that there were at least 200,000 acres with a suitable surface and that enough water would be available to irrigate at least 120,000. How long is the irrigated tract as shown on the map? How wide? How does such an amount of land compare in area with Rhode Island?

2. Objects of preliminary surveys

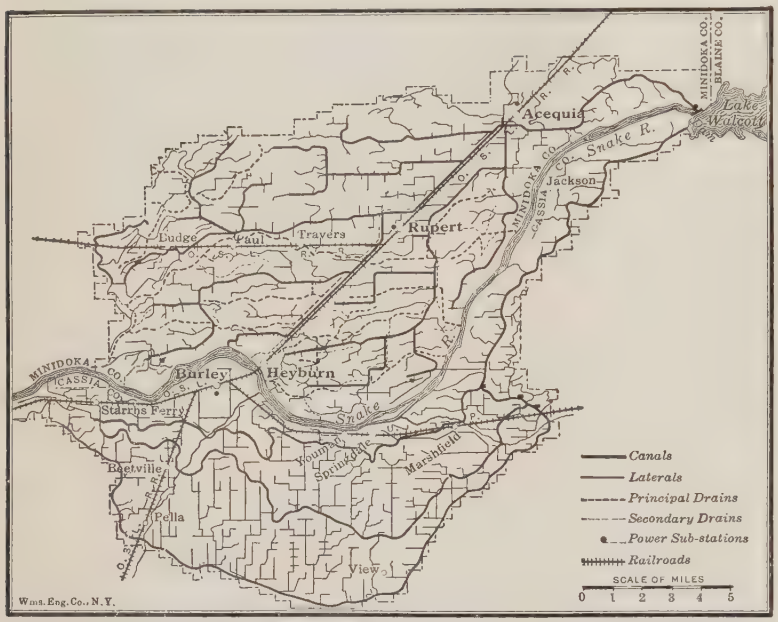


Fig. 159. — The Minidoka Irrigation Project

Locate this area on Fig. 156. Compare the scales used in these two maps.

Next a site was selected for a dam. The place chosen was a narrow gorge where the river had cut through the lava deposits; and the dam was built so strong and high that it could hold back practically all the spring floods until such times as the water would be needed on the plains below. Such dams are known as *storage*, *diversion*, and *power* dams; for they store water for the dry season, divert the water from the artificial lakes they have formed into canals that run to the irrigated land, and provide falling water with which to generate electricity for power, heat, and light. A small portion of the chief artificial lake thus created on the Minidoka Project is shown in Fig. 159.

3. The plan of construction

From this lake two canal systems run, one on either side of the river, over the irrigated land. The main canals, as the map shows, border the valley on either side; water runs from these into smaller canals and again into still smaller canals or ditches, so that all the land may be reached by the water. There are more than 600 miles of canals in this project. Some of the land cannot be reached by the gravity system of canals that run directly from the diversion dam, so pumping stations have to be provided. These are run by electricity generated at the diversion dam.

Water that is distributed over the land

disappears or is used up in many ways. Some evaporates, for evaporation is rapid in most portions of the West in summer because the air is very warm and dry. Much water is taken up by the plants and is used in the formation of plant tissues. Some water sinks into the ground beyond the reach of the plant roots, and its value is lost to the farmer. An important problem for the irrigation farmer is to utilize as much of the water for plant growth as possible.

4. The distribution of the water

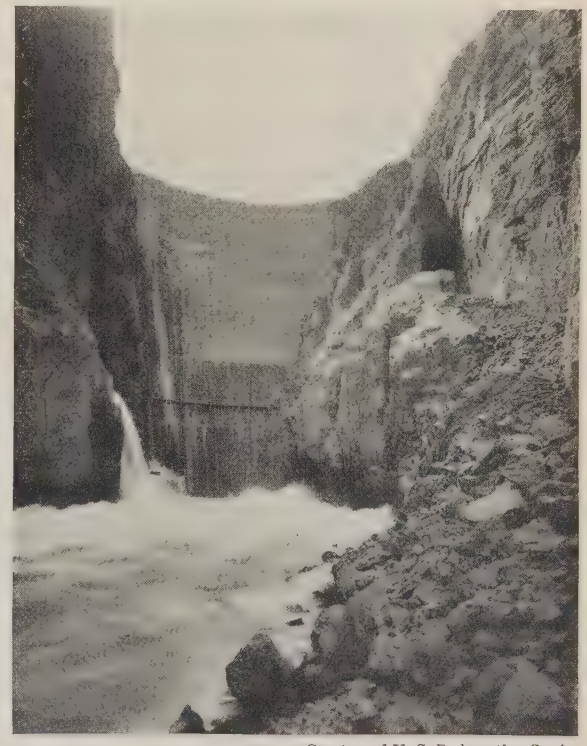
Life here is decidedly different from life in humid regions. Living conditions are much the same for all the families. No one is very poor, and all have good homes. Furthermore, being so shut off from the surrounding territory and so closely associated in many ways, they are more neighborly than usual and meet often to discuss common problems. Clubs and other organizations flourish; and, understanding the value of coöperation, the people have good roads, good schools, and other comforts and amusements. The cheap electricity generated by the water as it flows from the diversion dam enables every home to have electric lights and electrical devices of many sorts.

5. The unusual life of this community

The usual size of the farms on the Minidoka Project is forty acres. Scarcely anyone has more than 160 acres, partly because large landowners, who might monopolize the benefits of irrigation, are not wanted; and partly because one family cannot usually cultivate a large acreage successfully. Agriculture is here intensive. The cost of the land without water rights is in some cases as high as fifty to seventy-five dollars per acre, and the yearly cost for water is from one to three dollars per acre. When improvements are made in the land, however, in the shape of buildings and orchards, its value becomes $200 to $500 or more per acre.

6. Agriculture on the irrigated land

The high value of the land and the great distance to markets force the farmers to get as much out of the soil as they can.



Courtesy of U. S. Reclamation Service

Fig. 160. — Shoshone Dam across the Shoshone River, Wyoming

This dam is a part of the engineering works connected with the Shoshone Irrigation Project. The dam is built in a narrow canyon of the river. It is 328 feet high and only 200 feet long at the top. A lake with an area of more than ten square miles is formed behind the dam, large enough to supply water to 150,000 acres of land. Locate this project on Fig. 156.

They have the advantage of farmers in humid regions in that they can give their crops water whenever they need it. Alfalfa and sugar beets are among the chief crops; and these form the basis of the dairy industry. Potatoes, clover seed, and some grains and fruits, especially apples, are also raised.

The Minidoka Project cost our government about $6,000,000. This cost was paid by the people who purchased the land. About how much would that be for each of the 120,000 acres

7. Cost of the project

Photo by Laval and Ninnis

Fig. 161. — Raisin grapes grown in California

California is the only state producing large quantities of raisins. Many kinds are grown, some with seeds and others without. Most of the raisin grapes with seeds are now seeded in large plants with specially constructed machinery. Why is the climate of California ideal for drying fruit?

in the project? What benefits have come from the expenditure of this money?

Fig. 18 shows what a large part of California lacks sufficient rainfall for agriculture; yet irrigation has wrought wonderful changes in that state. Owing to the westerly winds in winter from the Pacific, the temperatures are moderate, and many of the crops grown in Florida are grown here also. The Valley of California (Fig. 157), drained by the Sacramento and the San Joaquin rivers, is noted for its agriculture. It is a remarkably fertile, level region about 400 miles long. Estimate its average width and compare its area with that of some of the Northeastern States.

The extent and variety of crops raised by irrigation

1. In the Valley of California

Before irrigation was introduced, wheat was the principal product, and at one time California was our leading wheat state. Now there is a large variety of crops, many of which are grown by irrigation. All the common grains are raised; a great amount of hay, potatoes, and other vegetables; and a large quantity of sugar beets. Almost all kinds of fruit flourish here, particularly grapes, peaches, apricots, oranges, plums, prunes, apples, cherries, and figs. A larger area is given to the raisin grape than anywhere else in the world, and most of the olives grown in the United States come from this valley. Rice culture has recently been introduced in the Sacramento Valley (p.108); this is already so important as to compete with rice imported from Japan.

Fig. 156 shows how much of this valley is now irrigated. There is abundant water from wells and from mountain streams for other irrigation projects; and as their number grows the population of the valley will greatly increase. Note the cities located in it.

2. In southern California

Thousands of persons were first attracted to southern California by the climate; then, seeing the opportunity of raising fruit, they planted orchards. About three fourths of the

oranges, one fourth of the grapefruit, and almost all the lemons grown in the United States, come from southern and central California. Among other products are olives, almonds, English walnuts, and grapes. Nearly every home about Los Angeles has its fruit trees, and in many cases the houses are surrounded by them.

In the extreme southeastern part of the state is the irrigated district known as the Imperial Valley. In 1900 this was waste land; but by means of water from the Colorado River about $70,000,000 worth of products was taken from it in 1920. Already 600,000 acres are under cultivation and plans are under way for supplying water to half as many more.

One of the new crops here and also in Arizona is "long staple" cotton, which is especially useful in the manufacture of automobile tires. The value of this one crop in 1920 was $23,000,000, which, though only one twentieth of the value of Texas cotton, suggests that the irrigated lands in California and Arizona may figure prominently in cotton production (p. 101). Other leading products in the Imperial Valley are cantaloupes, barley, and live stock.

Courtesy of California Fruit Growers' Assn.

Fig. 162. — Picking oranges in an irrigated orchard in California

The oranges are cut from the trees with clippers. They are never pulled, and the pickers wear gloves to avoid scratching the fruit. Care is also taken to avoid bruising the oranges. See if you can find an advertisement of California oranges. What claim is made for the fruit?

Denver and Salt Lake City owe their importance as centers for surrounding mining districts partly to the abundant vegetation in their vicinity, made possible by irrigation. Note in Fig. 156 how extensive are the irrigation systems near these cities. The high altitude of these sections and their continental climate prevent the cultivation of subtropical fruits; but many kinds of vegetables can be raised, in addition to many of the fruits raised in California. These districts likewise produce a large amount of grain and forage crops.

3. About Denver and Salt Lake City

Irrigation is just as extensive in the northern as in the southern states of this group except along the Pacific watershed, where, because of the ample rainfall, it is not needed. Note how much there is in Montana, especially along the upper Missouri River (Fig. 156). One of the most noted irrigated sections is the Yakima Valley, just east of the Cascade Mountains in Washington. It is famous for its apples, peaches, and pears, which are sold in almost every grocery store in the East. Some of the advantages for fruit in the West are that the

4. In the Northwest

dry climate checks the development of insect pests; the isolation of the irrigation projects makes it easy to prevent their spread; and the absence of wet spells prevents the ripe fruit from rotting on the trees. Orchards in this region are sold for from $500 to $1,500 per acre, which is a price rarely reached for even the best farm lands outside of irrigated areas.

In Fig. 156 note how many other irrigated areas are found along the Columbia River and its tributaries in Idaho, Oregon, and Washington. Like the Yakima Valley, they grow great quantities of fruit, alfalfa, and other forage crops.

Fig. 163. — The Mormon Temple and Tabernacle, Salt Lake City

The Mormons migrated to Utah about 1846. By irrigation, they have made the arid region west of the Wasatch Mountains one of the most productive in our country. The Temple, in the foreground, is one of the most beautiful churches in America. The tortoise-shaped building in the center of the picture is the Tabernacle, famous for its great organ.

About the time of the discovery of America sugar was sold in London for as much as $2.75 per pound; and since a laborer's wages were then only a few cents a day we may be sure that he did not buy much of it. Now it is considered a necessity for everybody. The most prosperous nations use the largest amount, so that one way of judging the wealth of a country is by the quantity of sugar it consumes. England, for instance, consumes twelve times as much per person as Italy.

How a new farm industry has developed through irrigation

1. Some steps in the use of beets for sugar

For a long time the principal source of sugar was cane; no one thought of using beets for that purpose. Finally, however, chemists discovered that beets contained sugar. During a shortage of sugar in France, a prize was offered to any one who would make sugar out of materials produced in that country. Chemists went to work on the problem and were soon manufacturing sugar from beets. When the shortage was over, however, cane sugar was again used and sugar beets were neglected.

Yet they were not forgotten. There had been two obstacles in the way of their use. The beets that were raised at that time were not very sweet; and only a small part of their sugar could be extracted. Scientists have kept at work on these two problems ever since, with remarkable results. They have so improved the beet that some beets yield one sixth of their weight of sugar; such beets are even sweeter than sugar cane. Methods of manufacture have also been discovered by which nearly all the sugar can be extracted.

With these improvements the sugar beet has come more and more into use, until it furnishes more than a third of the world's supply of sugar. We import a large part of what we use, but we now produce several times as much beet sugar as cane sugar. While the two kinds are so alike that you can scarcely distinguish between them, they are

obtained in very different ways. You know the climate necessary for sugar cane, and how the cane is raised (p. 106). Let us consider what climate is best for beets, and the method of raising them.

2. How sugar-beet farming is carried on

a. Temperature conditions required

The temperature conditions required for sugar beets are suggested by comparing Fig. 117 with Fig. 12. The leading state in the production of beet sugar is Colorado. California ranks second. What other states are prominent in this industry? Note that Michigan is the only important sugar-beet state outside the arid area. In what temperature regions are these states? How, then, does the temperature permitting the growth of sugar beets differ from that required for sugar cane? They thrive best not only in a cool climate, but where they can have plenty of water in the spring and early summer with dry weather in August and September. Bright sunshine helps greatly to form the sugar.

b. Methods of beet culture in a typical sugar-beet district

The valley of the Arkansas River in eastern Colorado is a typical sugar-beet district. The principal rains come in the spring and early summer, as desired, and the sun shines nearly every day in August and September. Since less than twenty inches of rain falls each year, irrigation is necessary, and the fact that the land is almost perfectly level makes the application of water easy. Ditches lead from the river to the fields; but the farmers depend upon wells for water when the river is low. Beets require a great deal of water while they are growing.

The farms are small, many of them containing only forty acres in beets; but that is all that one man can cultivate with a team of horses. The ground is prepared as early in the spring as possible; and the seed is planted in double rows about two feet apart. Beet seed frequently fails to germinate well, so it is planted very thick. Soon after the young beets are up they must be thinned, which is a tedious task. These young beets look so much like little weeds that the work must be done with great care, and there is no substitute for human fingers. Hoeing and weeding must be continued throughout the summer.

Harvest time comes just before frost, when the beets are fully matured. They are dug by a machine that throws them out on the ground, but they must be picked up and loaded by hand. The factory contracts for

Courtesy of U. S. Reclamation Service

Fig. 164. — Irrigating sugar beets in Colorado

The beets are planted in double rows, separated by furrows from twenty to twenty-four inches wide. The furrows lead off from a large ditch into which water for irrigating the field is led.

the full crop at a certain price per ton even before the beets are planted; and at harvest time they are hauled to it in wagons, which are dumped by machinery. Many farmers sell the beet tops for cattle feed. Others have herds of their own, to which they feed the tops during the fall and early winter. After that they feed them beet pulp from

the factory, *i.e.*, the part of the beet that is left after the sugar has been extracted.

The success of dry farming. — In spite of the wonderful success of irrigation in the West, only a small percentage of the arid land is farmed by its help (Fig. 156); an enormous area is still unused. Much of this is too rocky and mountainous ever to be cultivated, and parts of the rest are too dry even for *dry farming*. Water is necessary for this type of agriculture, just as for any other, in spite of the name; it is called dry farming only because it requires less than the usual amount. It can hardly succeed where the rainfall is less than ten or twelve inches, and a rainfall of fifteen or more inches is desirable.

Where dry farming is possible

Fig. 18 shows how large an area receives from ten to twenty inches. In a large portion of this area dry farming is possible. In which states would you expect it to be most extensive?

The West at first proved to be a very deceptive farming country. Some of the land receives its principal rains in the spring, when flowers bloom gayly, the grass is green, and song birds are many. The deep, fertile soil invites the plow; and now and then, even through several years at a time, there is plenty of rain during the growing season.

Hardships endured in learning to farm such land

About 1880 people began to migrate to the dry lands east of the Rocky Mountains in large numbers; and finding these favorable conditions in many sections, they became enthusiastic settlers. Then came years of drought and disaster. The short growing season in the spring was followed by hot winds that dried up every green thing. People lost everything they had. Many towns were entirely abandoned, and even whole counties were left almost without inhabitants.

All this time the most observant settlers were learning. They studied the climate, the soil, and the crops suited to both; and they were greatly aided by the experiment stations of the national and the state governments. In time a new system of farming was developed, which is now called dry farming. To use this method with success, it is necessary to select crops that can withstand drought. Some plants store up moisture during wet weather, just as some animals store up fat in summer; and this lasts them through a long dry period. Some stop growing and live in a dormant condition during a dry spell, just as bears and woodchucks hibernate, and when rain comes they begin to grow again. Others close up their pores so that the moisture within them cannot evaporate; and still others have leaves that expose very little surface to the sun, or roots that reach an astonishing distance down into the earth in search of moisture.

The selection of crops

1. Types of vegetation suited to dry farming

Many parts of the earth were searched to find crops that were adapted to a dry climate. One of the most valuable of these is *alfalfa*. Its roots extend many feet down into the earth, and thus protect it against any ordinary drought. Millions of acres of it are now grown, both under irrigation and by means of dry farming. *Sorghums* are also very valuable, for they have the power to close their pores and to cease growing during a dry spell. There are several varieties, as, for example, sweet sorghums, broom corn, and kafir corn. These all have broad leaves and bushy tops and look like small sugar cane. The dried stalks make excellent fodder and the grain of some is nearly as valuable a

2. Plants that meet these requirements

food as corn or oats. There are millions of acres of sorghum in the West. There is also a certain kind of winter wheat that is well adapted to arid lands. It is sown in the fall, grows rapidly during the spring rains, and matures before the drought is severe. The long dry period that follows is just what is wanted for harvesting and threshing. A large amount of wheat is thus raised and forms the chief dry-farm crop in many districts, especially in eastern Washington. The methods pursued by the owner of the wheat farm described on pp. 66–68 were in many respects similar to dry-farming methods. Certain kinds of beans are raised extensively by dry farming. Various kinds of grasses, also, such as Sudan grass from Africa, are being tested at experiment stations; some of these promise to become very valuable.

Photo by Gifford

Fig. 165. — A combined harvester at work in a wheat field of the Northwest

This machine is so large that a great many horses are required to pull it and operate the machinery. Merely the heads of the wheat are cut. The machine threshes these heads, the grain being caught in sacks and tied. The straw is later " plowed under " to enrich the soil.

Method of cultivating the soil

Besides finding suitable plants, it was necessary to learn how to cultivate the soil so as to make most use of its moisture. It was found to be necessary to keep down all weeds, for they take up water rapidly. Another requirement is to make the ground so mellow by deep plowing and pulverizing that it will absorb all the rain that falls, instead of allowing a considerable portion of it to run off. The next thing is to hold the moisture there. Much of the water that sinks into the soil soon begins to creep back to the surface again and evaporate. It is important to check such evaporation as fully as possible, for in an arid country it tends to be especially rapid. Experiments have been made showing that on the Great Plains as much as sixty inches of water will evaporate in a year, while in the Northeastern States the amount averages only twenty-five inches. The cooler temperatures in the states bordering on Canada give them an advantage in this respect over the others, but all the arid lands suffer seriously from evaporation unless it is carefully checked.

1. How the moisture is preserved

When the surface soil is allowed to harden, small tube-like openings are found in it extending upward, which conduct the moisture rapidly to the air; but if the surface is cultivated or harrowed so as to form a top layer of fine dirt, or *dust mulch*, such openings are prevented from forming and the escape of moisture is greatly checked. The farmer, therefore, must cultivate and harrow his fields frequently. In that way they can

be kept green with crops all summer, while surrounding fields not so treated are burned brown and bare.

In some localities the rains are not sufficient to produce a good crop every year even when such precautions are observed. In that case farmers resort to the device of saving up the moisture of two years in order to produce one crop. For example, in some parts of eastern Washington, near Spokane, where wheat is the chief crop, the farmer plows his ground in the fall as if he intended to sow wheat; and then during the following year he keeps the top soil well stirred, so that it will absorb all the rain and permit very little evaporation. The second fall he sows wheat, and the following summer he has a fine crop.

2. Special methods where rainfall is insufficient for annual crops

From The Geography of the World's Agriculture (1910)

Fig. 166.

Extent and methods of grazing. — The extent of cattle raising in the West is shown in Fig. 73. How do cattle compare in number here with those in other parts of the country? They often graze a part of the year in the buffalo grass found in the arid lands, and during the rest of the year are fed alfalfa and other forage crops grown by dry farming or irrigation. The old custom of herding vast numbers of cattle on the government *ranges*, which had no fences and were free to everybody, has largely disappeared, and now most herds are fenced in on private land. Even the privately owned ranches, however, are on the average much larger than the farms in the North Central States, and herds of thousands of cattle are not uncommon.

Of cattle ranching

That the West is especially adapted to sheep is indicated in Fig. 166. One reason why they thrive there is the fact that they bite off the grass very close to the roots and thus often find nourishment where cattle would starve. Sheep are thus raised extensively not only in the Great Plains region but also in the Rocky Mountain region and the three plateau regions farther west. The great extent of this industry is shown by the fact that sheep are raised in large numbers as far south as New Mexico and as far west as eastern Washington and Oregon. A good-sized sheep ranch in Wyoming or Montana has from 25,000 to 40,000 head of sheep. These may feed partly upon government land, or the range, and partly on land owned by the ranchman. During the coldest winter weather, when the snow may be so deep that the sheep cannot obtain food, they are often driven into protected *corrals* and fed on alfalfa. The fierce winds of the open plains help them, however, by drifting the snow and thus leaving open patches where they can find grass; so also do the warming

Of sheep ranching

1. Method of herding

Chinook winds (named from the Chinook Indians), which sweep down from the mountains and melt even heavy falls of snow with astonishing rapidity (p. 184).

When the sheep are feeding on the range, one man with dogs can herd 2,500; if he has a horse to ride, he sometimes takes care of 5,000. Selecting a spot near water for a camp, the herder drives his sheep out each morning and back at night, going each day a distance of two or three miles from camp. When the grass is eaten in one place, the camp is moved; then, from the new point as a center, they wander out as before. When the supply of water is sufficient to permit frequent camping places, camp is moved almost every day to keep the sheep always in fresh pasture.

The life of the herder is extremely lonely, both day and night being spent with the sheep. Once a week, perhaps, a man brings him food; and for weeks and even months at a time the only company he has, aside from his sheep, is his dogs and possibly a horse.

© *Press Illustrating Co.*

Fig. 167. — Sheep grazing in Wyoming

From the appearance of the landscape in this view, do you think these sheep are grazing on privately owned land or on the open range? What indications are there that this land is semi-arid, and therefore unsuitable for ordinary agriculture?

After the winter is over, the first income to the ranchman comes from the sale of the skins, or *pelts*, of sheep which have died during the cold weather. He expects to lose about one sheep in twenty each year from this cause (p. 219).

2. The sources of income from sheep

The next payment comes from the wool. Men who make it their business to shear sheep travel in squads. They erect sheds and pens near some sheep center, such as Billings, Montana, and shear all the sheep that are brought to them. Sometimes sheep are sheared at the ranch, but many ranchmen prefer to drive them to a market before they are sheared. In the southeastern states of this group, sheep are often sheared twice a year; but farther north it is done only once, as near the month of June as possible. Can you suggest a reason for choosing that time? After the wool is cut, it is pressed into bales and shipped to various markets in the East. Where would you think it might be sent, and for what purposes used?

From July on, many sheep are sold for mutton. Those that are from three to five years old, and have already borne a quantity of wool, are usually selected for this purpose. The hides are useful for leather and the bones for fertilizing the soil.

Advantages for manufacturing in the West. — The agricultural products of the

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Fig. 168. — Prune orchards in blossom, Santa Clara Valley, California

This exceedingly fertile valley is located just southeast of San Francisco Bay (Fig. 183).

arid area, like the minerals (p. 135), lead to a large amount of transportation and manufacturing. Many of the fruits are carefully packed and shipped fresh by rail to the large Eastern cities. The general use of refrigerator cars makes it possible to ship immense quantities of fresh fruit without danger of spoiling. Name some such fruits and also the localities from which you would expect them to come. The preparation for the market of such fruits as are not shipped fresh is really a type of manufacturing. Immense quantities of peaches, prunes, apricots, apples, grapes, and figs are dried, mainly by exposure to the sun. The rainless summers of California are especially favorable to this industry. In humid regions fruit soon decays if left out of doors; but in the sunny climate of that state it quickly dries. Most of the raisins consumed in our country are raised and dried in California, Fresno being the chief center for raisins. From what districts would you expect the other dried fruits to come? In addition, the canning and preserving of fruit is a very extensive industry, not only in California, but also in the Pacific Northwest, where the production of fruits greatly exceeds the amount locally consumed.

Influence of agriculture and grazing on manufacturing and transportation

1. In the preservation of perishable fruits

The abundance of alfalfa, with which to feed dairy cattle, has made it possible to

establish many creameries, and the abundance of sugar beets has caused the erection of many sugar refineries. In which states would you expect such factories to exist? The great number of cattle and sheep has given rise to slaughterhouses and meat-packing establishments in the leading towns and cities, and the great quantity of wheat to many flour mills. Spokane, for example, on account of the nearness of an important wheat region and its cheap power from waterfalls in the river that flows through the city is an important center for flour. Portland, Oregon, is also an important milling center.

2. In the establishment of large factories for food products

Thus we see that a considerable portion of the manufacturing in the West consists of the refinement or the preservation of its agricultural products, many of which are perishable. On the other hand, much of the manufacturing in the West is like that of the East. Articles that are easily made, or that are so bulky or heavy that their transportation for a long distance would be very expensive, are manufactured in so far as possible near where they are used. Thus, as we have seen, the milling of flour is a common industry both here and in the East; so also is the production of lumber, of meat, of mining machinery, and of many household and farm implements. The abundance of lumber in the Northwest gives rise to an extensive shipbuilding industry, and the cities on San Francisco Bay are engaged in important iron and steel manufactures and in the refining of oil (see p. 150).

How the manufacturing of the West compares with that of the East

Yet there is a marked difference in the character of the manufactures of the two sections as well as in their quantity. The metals obtained from the West — for example, the zinc, lead, copper, and silver — are to a large extent sent to the East, where they are made up into a host of articles that command high prices. So also is a large part of the lumber, hides, and wool. The metals may be made into clocks, the lumber into furniture, the hides into shoes, and the wool into clothing. As a rule, the first stages in the use of these materials, which require only the simpler processes, take place in the West; while the more advanced forms of manufacturing are left to the more highly specialized skill of the Eastern workers.

In some important kinds of manufacturing, however, the West surpasses all other parts of the country. For example, the sunshine, the mild temperatures, and the varied and beautiful natural scenery of the neighborhood of Los Angeles favor the

Special types of manufacturing in the West

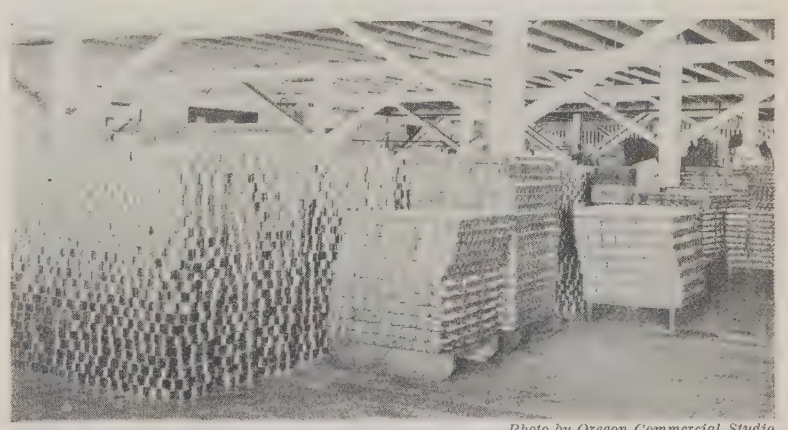


Photo by Oregon Commercial Studio

Fig. 169. — Cans of salmon ready for the market in a cannery at Portland, Oregon

The canning of fruits, vegetables, and fish that are abundant only a few weeks during the year is one excellent way of conserving our food resources. Can you see why?

Fig. 170. — A motion picture

The group of buildings on the left includes dressing rooms, indoor stages, property houses,

extensive production of motion pictures, which is now one of the leading industries of southern California. In 1920 there were fifty-five motion picture companies in Los Angeles, producing seventy-five per cent of the pictures made in the United States.

Abundance of power in the West. — The West is abundantly supplied with power for all types of manufacturing. Fig. 4 tells you how widely distributed the coal beds are. Name the states that have the largest. While California has very little coal, it has an excellent substitute, for it is a very close rival of Oklahoma, the leading oil state, in the production of petroleum. This is so abundant that it is used on steamships and locomotives in the West as well as in factories. In Fig. 30 note its location. Water power, likewise, is plentiful in the mountains. On account of the heavy rains and the ruggedness of the country, there is more power in the streams of the Pacific coast states than in those of any other section of equal area in the United States. There is a vast amount in the Rocky Mountains, also. Many of the streams come from ice fields in the mountains, where the melting in summer balances the lack of rain during that season, so that the flow of water is kept fairly uniform throughout the year.

The sources of power

Courtesy of Denver & Rio Grande System

Fig. 171. — Through the Rocky Mountains in Colorado

Note the two tracks, one on each side of the stream.

Not only does the West thus possess an abundance of water power superior to that

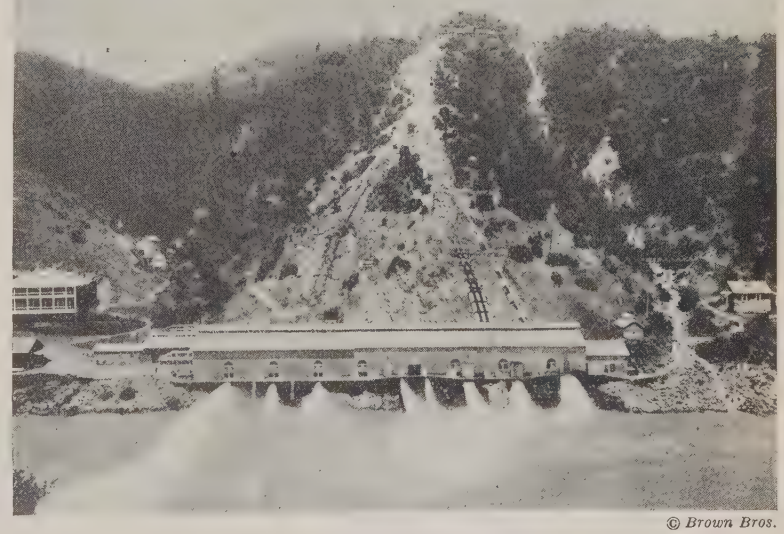
Photo by J. Mingo

studio in southern California

workshops, laboratories, and offices. On the right are shown outdoor sets and street scenes.

in any other section of the United States, but it has learned to make fuller use of it than is commonly done elsewhere. Buffalo (p. 34) and St. Louis (p. 73) are exceptional among Eastern and Middle Western cities in the extent to which they depend upon electricity for power. On the other hand, there is scarcely a large Western city that does not make very extensive use of the cheap power which is everywhere available. San Francisco receives electricity from electric-power plants, or *hydroelectric* plants, of immense capacity situated about 150 miles to the northeast on the western slope of the Sierra Nevada. Seattle is similarly supplied with electric power generated in the Cascade Mountains, and we have already referred (p. 149) to the abundance of power furnished Spokane by falls in the Spokane River. At Great Falls, Montana, the falls in the Missouri River generate electricity which is used as motive power by the Chicago, Milwaukee, and St. Paul Railway for a stretch of several hundred miles (p. 223). The Shoshone Falls in the Snake River, near the Minidoka Project which we have studied (p. 137), furnish neighboring cities and towns with such cheap power that electricity is used in almost every home for heating and cooking as well as for lighting.

The importance of hydroelectric plants



© Brown Bros.

Fig. 172. — A hydroelectric plant on the Yuba River, California

The water is brought in pipes down a very steep slope to the power house, the long low building near the center of the view. Here it is made to turn water wheels that are connected with dynamos.

Importance of small cities or towns in the arid regions. — In the interior of the arid area there are few large cities. Of the four largest, one is in Colorado, one in Utah, one in eastern Washington, and one in Montana. Name each of the four and locate it more accurately. Knowing the minerals and the agricultural products obtained near each, mention some of the leading industries.

Cities and towns containing only from 5,000 to 20,000 inhabitants are far more important than communities of equal size in the East. Fig. 233 shows only a few trunk lines extending across the country east and west, and there is not a large number of branch lines connecting them. Many ranches and even important irrigated sections are fifty miles or more from any town or railroad station. A town of less than 10,000 inhabitants, therefore, is likely to be a center for shipping cattle and sheep, for important kinds of manufacturing, and for trade, that serves people who live many miles away. It is usually a business center for many more people living outside its limits than inside. The number of automobiles parked on its principal streets may be as impressive as the number seen in many a large city. It is likely to have at least one department store, and its leading hotel is likely to be as good, if not as large, as the best in a city of 100,000 inhabitants in the Northeastern States. These facts explain why such towns as Albuquerque in New Mexico, Helena in Montana, Boise in Idaho, Phoenix in Arizona, and Laramie in Wyoming are so often mentioned in newspapers and in conversation even in the East. Locate these places.

Courtesy of Chicago, Milwaukee, and St. Paul Railway

Fig. 173. — An electric engine hauling a train in western Montana

The Chicago, Milwaukee, and St. Paul Railway was the first to operate its trains by electricity over long distances. Among the advantages of this method are the conservation of coal, the avoidance of forest fires from sparks from the engine, and greater comfort for the passengers owing to the absence of smoke and cinders.

The great resources of the Pacific Northwest. — After crossing the one-hundredth meridian in traveling westward from the Twin Cities to Seattle or Portland, one sees semi-arid land for many hundreds of miles. The absence of trees, the scattered tufts of grass, and the starved vegetation along most of the route give evidence of the lack of water. On crossing the Cascades, however, the scene abruptly changes. The dense forests, the thick, green grass, and other luxuriant vegetation suggest a heavy rainfall. Even in winter the difference in vegetation is striking, for the temperature west of the Cascades is very mild compared with that east of the same range, and flowers

The contrast between the arid area and the northwestern coast

1. In natural vegetation

often bloom throughout the year. From what you have already learned, can you explain the reason for this difference in temperature (p. 16)?

The contrast in population is as great as that in vegetation. We have already noted the thin population of the arid area (p. 130) and the small number of large cities (p. 152). West of the Cascades, however, the population is much more dense. On Puget Sound are Seattle, with a population of 316,000, and Tacoma, with 97,000; while Everett and Bellingham, each with over 25,000, are flourishing cities also. One hundred miles from the mouth of the Columbia, on the Willamette River, is Portland, Oregon, with a population of 258,000. In this relatively small area there are more than a million inhabitants. How can the development of this district be explained?

2. In population

The abundant rainfall and rich soil make farming especially attractive. The luxuriant grass is favorable to dairying, and this industry has kept pace with the development of the cities. The production of canned milk has become especially important. In addition, all the common vegetables thrive here, as well as most of the cereals. In western Oregon especially, many kinds of fruit are raised. Among these the apple is the most important, just as it is in Washington "east of the mountains" (p. 141). The pears also are of an especially fine variety; and peaches, plums, prunes, cherries, and grapes are raised in large quantities. Berries flourish also in western Washington. Large quantities of fruit from this district reach the New York and London markets.

Suitability for agriculture

This is one of the most noted lumber regions in the United States, and in the near future it is likely to be our principal source of supply. In the damp, mild climate of our western coast, the redwood, fir, cedar, and spruce grow to great size, the redwood, however, being confined to California. There are immense forests of great coniferous trees all the way from central California to Alaska. While the logs in Maine and Michigan are rarely more than two or three feet through, many in Washington and Oregon are from six to fifteen feet in diameter, and some in California are much

The great value of the lumber

1. The luxuriant forests

Photo by A. M. Prentiss

Fig. 174. — Felling Douglas fir in a forest in Oregon

These are about the average in size of the Douglas fir, the most important of the timber trees of the Northwest. Do you see any way in which lumber appears to be wasted here?

125°
121°
117°
113°
109°
105°
101°
53°
49°
45°
41°
Edmonton
Calgary
Regina
Lake Winnipegosis
Lake Manitoba
Saskatchewan R.
CANADA
Vancouver
Victoria
Strait of Juan de Fuca
Strait of Georgia
VANCOUVER ISLAND
Fraser R.
Columbia R.
Bellingham
Anacortes
Port Townsend
Everett
Seattle
Tacoma
Olympia
Aberdeen
Hoquiam
Raymond
Centralia
Chehalis
Ellensburg
Yakima
Spokane
Wenatchee
Stevens Pass (Cascade Tunnel) 3383 ft.
Stampede Pass 3000 ft.
Mt. Olympus 8150 ft.
Mt. Rainier 14,408 ft.
Mt. St. Helens 9697 ft.
Mt. Adams 12,326 ft.
Mt. Baker 10,750 ft.
Olympic Mts.
Puget Sound
Lake Chelan
WASHINGTON
COLUMBIA PLATEAU
Columbia R.
Snake R.
Clark Fork
Kootenai R.
Sandpoint
Coeur d'Alene
Kalispell
Flathead Lake
Wallace
Colfax
Moscow
Lewiston
Walla Walla
Pendleton
The Dalles
Vancouver
Portland
Astoria
Disappointment C.
Mt. Hood 11,225 ft.
Mt. Jefferson 10,522 ft.
Salem
Albany
Corvallis
Eugene
Bend
Marshfield
Roseburg
Crater Lake Nat. Park
Mt. Thielsen
Mt. Scott 8916 ft.
Mt. Pitt 8295 ft.
Diamond Peak
Medford
Ashland
Klamath L.
Malheur L.
Harney L.
Summer L.
Warner Lakes
Goose L.
Tule L.
Mt. Shasta 14,161 ft.
Klamath R.
Pit R.
Eureka
Cape Mendocino
Redding
Lassen Peak 10,465 ft.
Honey L.
Eel R.
Sacramento R.
CALIFORNIA
OREGON
Blue Mts.
Willamette R.
Rogue R.
Umpqua R.
Weiser R.
Baker
Caldwell
Boise
Nampa
Snake R.
Owyhee R.
IDAHO
Havre
Milk R.
Marias R.
Great Falls
Missoula
Deer Lodge
Anaconda
Butte
Helena
Bozeman
Bozeman Pass 5523 ft.
Livingston
Dillon
Red Lodge
Billings
Lewiston
Glendive
Miles City
Yellowstone R.
Missouri R.
Musselshell R.
Powder R.
Horn R.
Little Missouri R.
Cheyenne R.
Bismarck
NORTH DAKOTA
SOUTH DAKOTA
BAD LANDS
Rocky Mts.
Clearwater Mts.
Bitterroot Range
Salmon R.
Salmon River Mts.
Lemhi Range
Lost River Range
Big Lost R.
Big Wood R.
Trickson Butte
Wind River Mts.
Fremont Peak 13,750 ft.
Yellowstone Nat. Park
Yellowstone Lake
Cody
Sheridan
Cloud Peak 13,165 ft.
Thermopolis
Lander
Wind River Peak 13,499 ft.
Casper
Rawlins
Laramie
Cheyenne
Green River
Sherman Pass 8009 ft.
Rocky Mountain Nat. Park
Longs Peak 14,255 ft.
Boulder
Greeley
Lead
Black Hills
Belle Fourche R.
South Fork
Niobrara R.
North Platte R.
South Platte R.
NEBRASKA
WYOMING
Green R.
Bear R.
Bear L.
St. Anthony
Idaho Falls
Pocatello
American Falls
Rupert
Burley
Twin Falls
Shoshone Falls
Brigham
Logan
Ogden
Great Salt Lake
Salt Lake City
Uinta Mts.
Park City
Murray
Tooele
Provo
Lehi
Great Salt Lake Desert
Winnemucca
Humboldt R.
Elko
GREAT BASIN

WESTERN STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 25 50 75 100 150 200 300
Important highways
Railroads
State capitals
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Below sea level
Cities with over 300,000 Los Angeles
Cities with 200,000 to 300,000 Portland
Cities with 25,000 to 200,000 Tacoma
Other cities Helena
WILLIAMS ENGRAVING CO., N.Y.
Longitude West from Greenwich
121° 117° 113° 109° 105°
37° 33° 29°
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
TEXAS
OKLA.
MEXICO
PACIFIC OCEAN
LOWER CALIFORNIA
GULF OF CALIFORNIA
SIERRA NEVADA
GREAT BASIN
COLORADO PLATEAU
Sacramento
San Francisco
Oakland
Los Angeles
San Diego
Santa Barbara
Fresno
Bakersfield
Monterey
Stockton
Reno
Carson City
Virginia City
Tonopah
Goldfield
Las Vegas
St. George
Richfield
Moab
Grand Junction
Leadville
Colorado Springs
Pueblo
La Junta
Durango
Trinidad
Raton
Santa Fe
Albuquerque
Las Vegas
Roswell
Clovis
Grand Canyon
Flagstaff
Winslow
Needles
Phoenix
Prescott
Yuma
Tucson
Nogales
Bisbee
El Paso
Juarez
Las Cruces
Silver City
Alamogordo
Chihuahua
Rio Grande
Colorado R.
Gila R.
Salt R.
Pecos R.
Arkansas R.
Mohave Desert
Colorado Desert
Death Valley
Mt. Whitney
Mt. Lyell
Mt. Lyndall
Mt. Tom
Mt. Dana
Owens Lake
Tulare Lake
Salton Sea
Imperial Valley
San Francisco Mtn.
Marshall Pass
Raton Pass
Grand Canyon
Yosemite Nat. Park
Gen. Grant Nat. Park
Sequoia Nat. Park
Mesa Verde Nat. Park
Natural Bridges National Monument
Grand Canyon Nat. Monument
Pt. Conception
Santa Rosa
Vallejo
Richmond
Berkeley
Alameda
San Jose
Santa Cruz
Monterey Bay
Hanford
San Luis Obispo
Santa Monica
Venice
Long Beach
Santa Ana
Pasadena
Pomona
San Bernardino
Redlands
Riverside
Santa Barbara Islands
San Diego Bay
Tia Juana
Angels Camp
Grass Valley
Lake Tahoe
Walker L.
Mono L.
Owens R.
San Juan R.
Gunnison R.
Uncompahgre Plateau
Marshall Pass 10,856 ft.
Pikes Pk. 14,110 ft.
Cripple Creek
Sálida
Ouray
Silverton
Durango
Rio Grande
Canadian R.
Pecos R.
Gallup
Clifton
Morenci
Douglas
Juarez
Tehachapi Pass 3,966 ft.
Salton Sea 263 ft. below sea level
Mt. Lyell 13,090 ft.
Mt. Tyndall 14,386 ft.
Mt. Whitney 14,501 ft.
276 ft. below sea level

Fig. 175

Questions on Fig. 175. — 1. Trace on this map the course of the Continental Divide as shown on Fig. 17. Why does this appear to fork in Glacier National Park? 2. Except in the case of long stage routes in Nevada, important automobile routes appear to follow the railroads rather closely. Can you suggest why? 3. Identify on this map the land regions shown in Fig. 157. 4. If you wish to look up places smaller than those shown on this map, consult Fig. 499.

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larger. A single county in Oregon is said to contain three per cent of all the standing timber in the United States.

2. Methods of lumbering

A visit to a lumbering camp in western Washington will show that, owing to the size of the trees and to the climate, the work is carried on very differently from lumbering in other sections. The men are able to work both winter and summer. They select a tree which towers upward for perhaps 200 feet, that is, higher than most church steeples. Two men saw at this tree until the giant begins to quiver. It then tips slowly over, quickens its movement, and falls to the ground with a mighty crash, breaking good-sized trees in its way as if they were twigs.

After the branches are lopped off, the tree is sawed into sections of different lengths, such as twenty-four, thirty-two, or forty-eight feet. A single log sometimes occupies an entire flat car. From 25,000 to 40,000 feet of lumber, or enough to build several small houses, may be obtained from a single large tree. The logs are dragged by a steel cable to a railroad that extends from the forest to the mills, or they are chained together in great rafts (Fig. 176) and floated to their destination. Many of the logs go to Portland and the cities on Puget Sound, where there are large sawmills. There is such an abundance of wood in this district that it is burned as fuel in the lumber mills and in locomotives on the logging railroads. A large portion of the shingles used in the East come from these forests. In fact, lumber in all forms is being shipped to the East in increasing quantities. In both Washington and Oregon lumber is now greater in value than any farm product, even wheat, and its importance is sure to increase as the supply of lumber becomes exhausted in other sections.

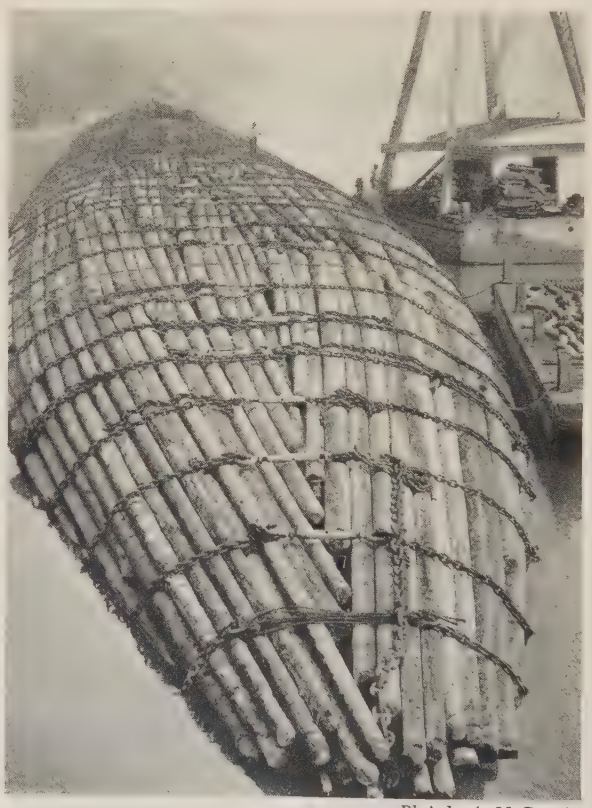


Photo by A. M. Prentiss

Fig. 176. — A raft of logs in the Columbia River, prepared for an ocean voyage.

On the Pacific coast cigar-shaped rafts are made of logs bound together by huge chains. While the rafts are being built, the logs are held in a cradle or form. After the chains are in place, the cradle is removed and the raft is ready for its journey. This raft will be towed to San Francisco.

Importance of fishing

Another industry that has attracted people to this coast is fishing. The waters

of our Pacific coast are as rich in varieties of fish as those of the Atlantic. The most important of these, commercially, is the salmon. From California northward, these are caught in large numbers as they attempt to ascend the numerous streams that flow into the ocean. The Columbia River and the Puget Sound fisheries are among the most important. The salmon spends much of its life in the ocean, but when it reaches maturity it ascends the freshwater streams to spawn, traveling in great schools toward the headwaters and ascending waterfalls many feet high. On their way they are caught by various methods. *Fish traps* are commonly used for this purpose. So also are *fish wheels* with wire buckets, that revolve in the current through which the fish swim. The buckets catch the fish up and drop them into slides below the wheels. Seines are also commonly used. The salmon are then taken to the canneries at Astoria, Bellingham, and neighboring towns, where they are cleaned and prepared for the market by smoking or, more often, by canning. Canned salmon are packed raw and cooked in the tins.

Photo by A. M. Prentiss

Fig. 177. — Drying salmon nets on the Columbia River

The nets need to be dried and mended frequently. This shows the frames on which they are stretched while drying. The man on the left is mending a net. The small boats are gasoline launches that are used to carry the men to and from the seining grounds and in lifting nets.

Another great commercial advantage in the Northwest is its superior facilities for transportation. Ocean vessels can reach Portland, where the fresh water of the Willamette River kills the barnacles on their hulls. This makes it much easier to clean the vessels by scraping them when they are put into dry dock. Canals and locks have been constructed along the upper Columbia, so that Portland has contact both by water and by rail with the country inland from it, from which are shipped large quantities of live stock and wheat. Portland also has good railroad connections with the Middle West, with California, and with Puget Sound. With these advantages, the city has become a leading center of the lumber industry of the Northwest; it exports great quantities of lumber and wheat, and is surpassed only by San Francisco among Western cities in wholesale trade.

Advantages for transportation

The cities on Puget Sound have admirable arrangements for shipping. The Sound is so inclosed that the ocean waves cannot reach it; it is largely free from drifting sand bars, which are an obstacle in many harbors; and the fresh water in the inner harbor at Seattle kills the barnacles on vessels as does the river water at Portland. Four transcontinental railroads have terminals at Seattle, so that the connection with the Middle West and East is especially good. At the same time,

the location of Seattle and Tacoma gives them excellent advantages for ocean traffic. They are natural ports for trade with Alaska, sending food, clothing, machinery, and many other goods, and receiving metals, furs, and canned salmon in return (p. 168). As Alaska grows in population this trade must increase.

The ports of the Pacific Northwest have also an advantage for trade with Japan and China, for they are nearer those countries than any other cities on our Pacific coast. Examine a globe in order to see this. Accordingly, from Seattle, Tacoma, and Portland wheat, cotton, iron goods, and lumber are shipped across the Pacific, while tea, raw silk, and rice are received in return.

Fig. 178. — Seattle and Tacoma

Name the cities on the shores of Puget Sound. On Fig. 175 trace the water route from these ports to the Pacific.

The contrast between Seattle and Los Angeles. — Advantages of Seattle There is a striking difference in the conditions under which Seattle and Los Angeles have developed. The rainfall about Seattle varies from thirty to nearly a hundred inches per year, so that there is no need of irrigation there. Los Angeles, on the other hand, has less than twenty inches and little agriculture is possible without resorting to dry farming or irrigation.

The inland country east of Seattle is wonderfully productive, both on account of the extensive irrigation systems east of the Cascades and the unusually successful dry farming in eastern Washington. The Sierra Nevada-Cascade ranges are lower in Washington than elsewhere in their entire length, and on that account allow the west winds to carry a greater amount of vapor eastward; and evaporation is little in a region so far north. On the other hand, the region east of the San Bernardino Mountains (Fig. 175) is almost a complete desert, and for hundreds of miles in that direction there is little farming except by irrigation.

Seattle possesses one of the best natural harbors in the world, while Los Angeles has had to make an artificial harbor by constructing a very extensive breakwater. Seattle has coal near at hand, and also water power for manufacturing. Los Angeles has no coal near it, and its main supply of water has been obtained by building one of the longest aqueducts in the world, the Owens River Aqueduct, all the way from Mt. Whitney, a distance of 240 miles.

Yet, in spite of apparent handicaps, Los Angeles is much the larger city; it is, in fact, the largest city in the Western States, having a population of 569,000. While it has no coal, it has a great quantity of petroleum near at hand (p. 150). In 1920, southern California supplied twenty-four per cent of all the petroleum produced in the United States. Furthermore, while Seattle has the advantage for trade with Alaska and with Asia, the location of Los Angeles so much nearer the Panama Canal gives it a corresponding advantage for trade

Advantages of Los Angeles

Photo by Asahel Curtis

Fig. 179. — Looking westward over the business section of Seattle

Puget Sound is seen in the background. Seattle has one of the finest harbors in the world. A canal has been built to Lake Washington to the east of the city so that the water front has been greatly increased (p. 157). The "skyscraper" in the middle of the picture is the L. C. Smith Building.

with our Southern and Eastern States. Probably the greatest attraction of Los Angeles, however, is its almost constant sunshine, combined with its delightful temperature and dry air, which have made it a favorite residence city and tourists' resort.

Note the remarkable number of smaller cities in southern California. How do they compare in number with those about Seattle?

The advantages of San Francisco compared with those of New York City and of New Orleans. — San Francisco, the oldest of our chief Pacific ports, is the western gateway to and from the United States, corresponding to New York City in the East and New Orleans in the South. San Francisco Bay, if possible, surpasses New York Bay as a harbor having an entrance called the Golden Gate, five miles long and one mile wide, which allows an easy entrance to vessels while it shuts out the ocean waves. Inside there is space for hundreds of ships, and there are wharves enough to accommodate all that come. Across the bay to the east are Oakland and other important cities. Name them. San Francisco is thus seen to be the center of a population approximately twice the size of the city itself. Compare it in this respect with New York.

New York Bay and San Francisco Bay compared

Inland from San Francisco is the Valley of California, drained by the Sacramento and San Joaquin rivers. While the products of this valley differ greatly from those about New York, their value is probably as great as those from any equal area near that city. East of this valley, however, is the

The districts inland from these cities compared

Fig. 180. — Los Angeles

Sierra Nevada, which forms a lofty chain and includes some of the highest peaks in the United States. On account of its height there is heavy rainfall on the windward side, yet the eastern side receives but little and the plateau for hundreds of miles farther east, including almost all of Nevada and much of Utah, is a desert or semi-desert. Examine Fig. 156 to see how much of this area is irrigated. This inland country, therefore, is strikingly different from that an equal distance inland from New York, and less productive. Thus because of the limited area of the fertile region immediately inland from San Francisco, that city is probably as limited as New Orleans (p. 123) in the productiveness of the country which seeks an outlet through it. San Francisco, however, enjoys a great advantage over New Orleans in the fact that it is the only important port between Los Angeles and Portland. Note on Fig. 175 the lack of good harbors between those cities. How far apart are they? Compare this distance with that between Galveston and Mobile, on either side of New Orleans (Fig. 112).

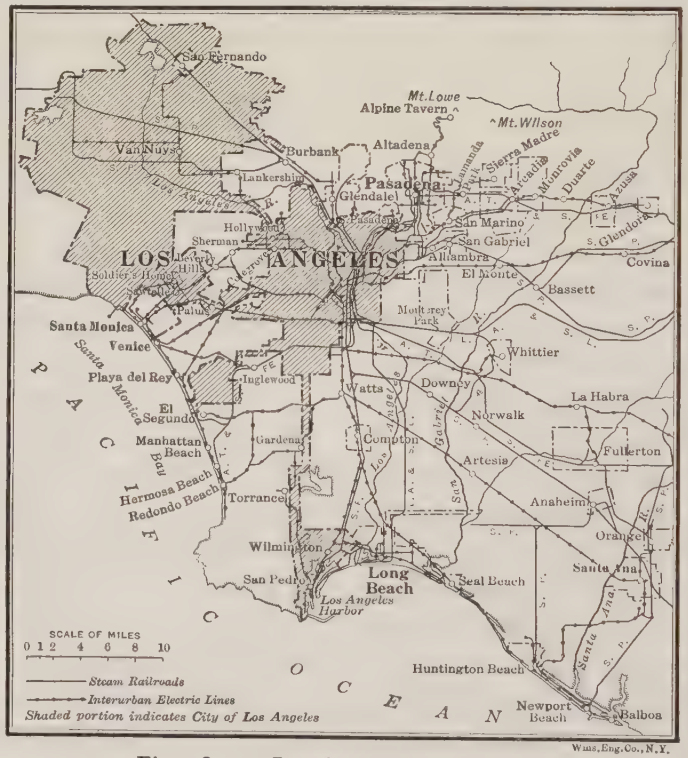


Fig. 181. — Los Angeles and vicinity

At how many points does the city touch the ocean? Note the network of steam and electric railways connecting Los Angeles with neighboring cities.

Again, while San Francisco faces the Orient, where there is a population nearly twice that of Europe, and has

Photo by Huddleston Photo Co.

harbor.

trade with Hawaii, Japan, China, the Philippines, and Australia, those countries have developed no such commerce as have the European countries. The imports and exports of this city are similar to those of Seattle (p. 158); and great quantities of cane sugar are imported from Hawaii, so that the refining of sugar is one of its chief industries. Yet its foreign commerce is not one tenth that of New York, which faces Europe, and is less than that of New Orléans, which faces South America. This is likely to grow considerably, however, as we develop greater commerce with the Oriental countries.

Their ocean commerce compared

Attractions of the West for tourists. — The entire West is noted for its natural scenery. There is hardly a spot in this entire section from which mountains cannot be seen on a clear day. Snow-clad peaks, blue mountain lakes, and bold promontories are common in all three of the coast states, while the sunset colors in the arid region form an almost greater attraction. Even in the large cities the scenes are often of great

The scenery of the large cities

Photo by K. I. Waters & Co.

Fig. 182. — The civic center, San Francisco

In the more progressive American cities there is a tendency to centralize the important public buildings. San Francisco is justly proud of the buildings shown in this view. The building with the dome is the City Hall. In the center of the picture is the Exposition Auditorium. The building with many columns on the left is the Public Library.

beauty. From the hills of Seattle one can look across Puget Sound to the Olympic Mountains on the western horizon, and from both Tacoma and Seattle Mt. Rainier, with its glaciers, is plainly visible. From Portland one has magnificent views of several snowy volcanic peaks, including Mt. Hood, Mt. Adams, and Mt. St. Helens. Locate these on Fig. 175. At San Francisco the waters of San Francisco Bay and the Golden Gate give added beauty to the mountains of the Coast Range that rise beyond them. Los Angeles, Salt Lake City, and Denver afford splendid mountain panoramas.

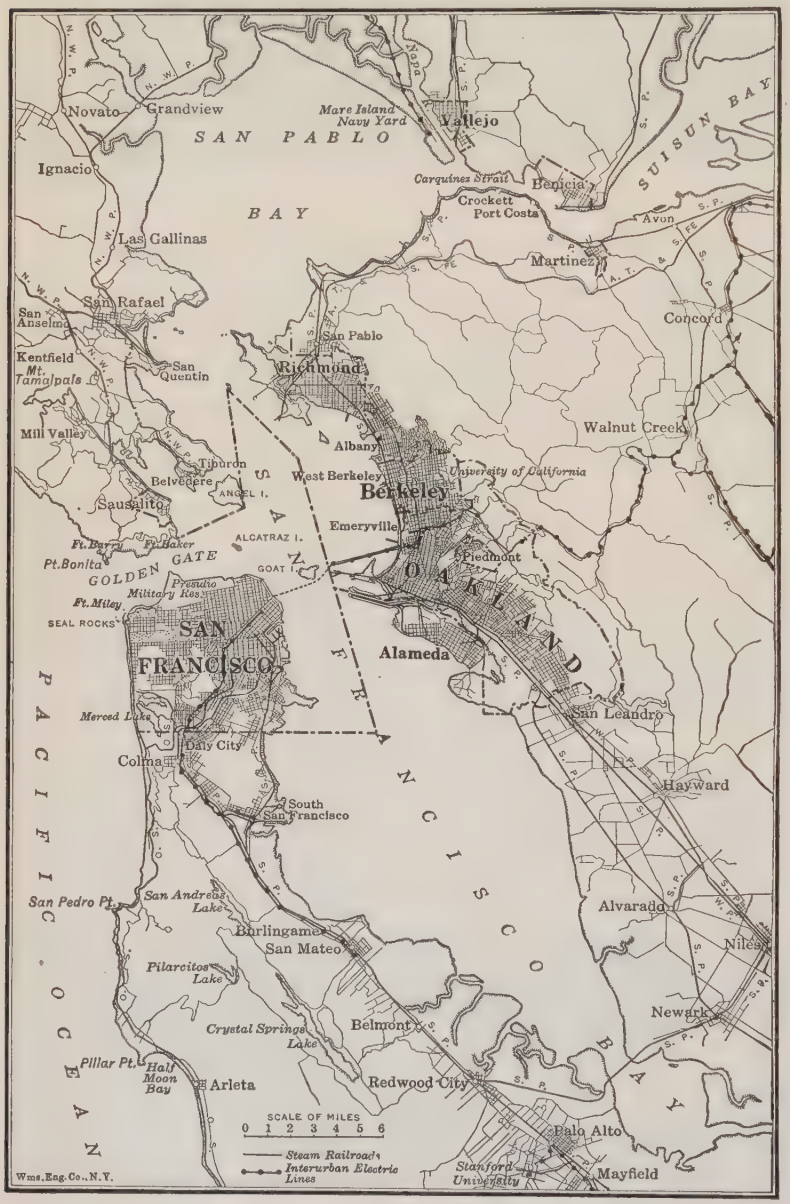


Fig. 183. — The San Francisco Bay region

This bay is one of the finest harbors in the world, large enough to shelter the fleets of many nations. How long is it? How wide? What cities are on its shores? Locate the two large universities. Locate the navy yard.

The great variety of attractions

At a distance from the cities, also, in many places among the Western mountains are scenes as beautiful as those of the Alps (p. 334). These attract many tourists. Strangely formed cliffs, deep canyons, lofty peaks, imposing waterfalls, and glaciers are here without number. Many of these scenes may be viewed from the train, as, for instance, the Royal Gorge through which the Denver and Rio Grande Railroad penetrates the Rocky Mountains; Pike's Peak in Colorado; Mt. Rainier near Tacoma; and Mt. Shasta in northern California. Still others, equally famous but not visible from trunk railroad lines, are Glacier National Park in Montana, Crater Lake in Oregon, and Lake Tahoe in California and Nevada. Find these on the map (Fig. 175).

Among all the interesting places, however, are three that are perhaps better known than any of the others. These are the Yellowstone National

Fig. 184. — Portland, Oregon, with Mt. Hood in the distance

Locate Portland and Mt. Hood on Fig. 175. In what direction was the camera pointed? How far away is Mt. Hood?

Park, the Grand Canyon of the Colorado River, and the Yosemite National Park.

The Yellowstone Park, chiefly in Wyoming, is a tract of land nearly as large as Connecticut, which the government has set aside as a national park. It is often called the "Wonderland of America." A stage and automobile road leads from a spur of the Northern Pacific Railway to the Mammoth Hot Springs on the northern side of the park. There is also a highway from the Oregon Short Line on the western side, as well as a highway entering the park on the east from Cody, Wyoming. At the Hot Springs, from openings in the hillside, hot water flows down over beautifully colored terraces, which have been built by a deposit of mineral matter carried in solution in the hot water. Farther on are boiling springs; also boiling mud springs of different colors; and here and there are springs called *geysers*, from which hot water and steam now and then burst forth with great violence even to a height of 100 or 200 feet.

Three of the most noted places

1. The Yellowstone Park

a. Its hot springs and geysers

Beyond the geyser basins is Yellowstone Lake, a beautiful sheet of water nestled in the mountains, nearly 8,000 feet above the sea. It is one of the sources of the Yellowstone River, a tributary of the Missouri.

b. Its lake, falls, and canyon

Photo by A. M. Prentiss

Fig. 185. — Crater Lake, in Crater Lake National Park, Oregon

This lake occupies the crater of an old volcano. The surface of the lake is more than 6,000 feet above the sea. The water at places is 2,000 feet deep and some of the cliffs bordering the lake are 1,000 feet high.

To many persons, the falls and canyon of this river are the greatest wonders of the park. Soon after leaving the lake, the stream narrows and quickens, and the water leaps more than 100 feet directly downward. A short distance farther on it tumbles more than 300 feet, or almost twice the height of Niagara (Fig. 27). The river then runs between steep walls, which rise 2,000 feet above it. This canyon is somewhat winding, with numerous bold cliffs jutting far out into the abyss.

In this park hunting is prohibited, and for that reason wild animals are numerous and quite tame. When driving through the park one can sometimes see elk by the roadside; and bears, both brown and black, come close to camps and hotels for food. There are many other animals here, including one of the few remaining herds of bison, or buffalo.

c. Its animals

One portion of the Grand Canyon of the Colorado, in Arizona, may be reached by a branch line of the Atchison, Topeka, and Santa Fé Railway. The wonderful Yellowstone Canyon, just described, and the chasms along the Denver and Rio Grande in Colorado are pygmies compared with this.

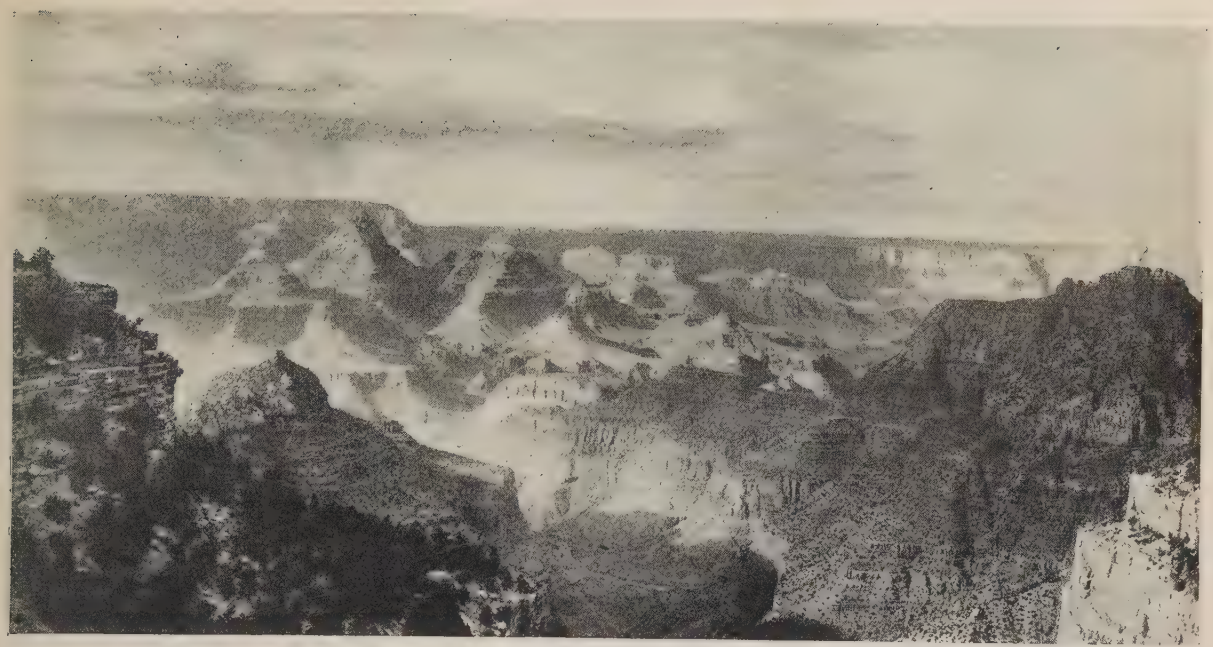
2. The Grand Canyon of the Colorado River

As one first looks out into the canyon, nothing is seen but towers, pinnacles, many

© *Detroit Publishing Co.*

Fig. 186. — Yosemite Valley, in Yosemite National Park, California

Yosemite Valley is a gorge cut chiefly by glaciers that moved down several valleys in the Sierra Nevada and united at this point. The valley varies in depth from 3,000 to 5,000 feet.



Courtesy of Atchison, Topeka and Santa Fé Railway

Fig. 187. — The Grand Canyon of the Colorado River, Arizona

Locate the canyon on Fig. 175. At places it is more than a mile deep. This great chasm is the work of the river. For millions of years it has been wearing the rock away, making the canyon larger and larger. The material washed out of the canyon is being deposited in the delta of the Colorado River.

colored layers of rock, and apparently bottomless depths. When one finally reaches a point from which the thread-like stream may be spied at the bottom of the canyon, a mile below, it seems almost impossible that so little water could have wrought such mighty havoc. Yet this river has been slowly cutting its way into the rocks for thousands of centuries, and this great chasm is the result.

For more than 200 miles the Colorado River flows at the bottom of this deeply cut canyon, which forms almost a complete barrier to travelers. A person living on one side, where he could see across to the other side, ten to thirteen miles away, would need to travel hundreds of miles to reach that side; for there are no railways, roads, or easy paths leading across. The government has set aside this wonderland also as a national pleasure ground.

The Yosemite Valley, on the western slope of the Sierra Nevada in California, combines the grandeur of a deep canyon with the beauties of mountain scenery. The floor of this valley, reached by a branch of the Southern Pacific Railroad, is flanked by lofty, precipitous granite domes. The snow-covered High Sierra lies beyond, in the distance. Mountain creeks pour their waters over the faces of the cliffs in waterfalls of great beauty and height. Many trails lead to the summits of the surrounding domes, from which the traveler may overlook the valley many hundreds of feet below.

3. The Yosemite National Park

Only a few miles from this valley are the giant trees of the world (see Frontispiece), the *sequoias*, the largest of which is thirty-six feet in diameter and about 300 feet high. The Yosemite region, like the Yellowstone, is a public park, and is visited every year by thousands of people.

Facts to be especially well fixed. — 1. Names, location, and direction of the three principal mountain systems. 2. Climate in different regions. 3. Location of Denver; Pueblo; Butte; Helena; Boise; Salt Lake City; Santa Fé; Phoenix and Prescott; Los Angeles and cities near it; San Francisco and neighboring cities; Portland; Seattle and cities near it. 4. Location of principal coal fields; of oil districts. 5. Chief mineral products. 6. Names and location of principal rivers.

Problems for independent study. — 1. If man had the power to remove the Sierra Nevada-Cascade ranges, would it be desirable to do it? Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 21–23 (Ginn); McMurry, C. A.: *Larger Types of American Geography*, pp. 40–43, 46, 50–52 (Macmillan). 2. Trace the Continental Divide as indicated by the sources of the rivers in the Rocky Mountains. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 26–27. 3. Why are mountainous regions particularly noted for mining? See Encyclopædia Britannica under *Mineral Deposits;* Tarr, R. S.: *New Physical Geography*, pp. 108–109, 315 (Macmillan). 4. Name several obstacles in the way of irrigating much more of the arid area. *Lessons in Community and National Life*, Series C, Lesson C (Department of Interior, Washington, D. C.); National Geographic Magazine, vol. 18, 1907, pp. 217–243; vol. 19, 1908, pp. 251–287. 5. Wind is one of the greatest enemies of dry farming. Why? 6. What has been done with the Indians in the West? Carpenter, F. G.: *North America*, Chapter XXXIX (American Book). 7. In what part of the West would you prefer to live? Why? 8. If you were allowed to spend a winter either in southern California or Florida, which would you choose? Why? 9. Let each one of several pupils plan a month's visit in the West, and then see to what extent their plans differ. 10. Hydraulic mining has been prohibited in many sections. Why? Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 197–198 (Ginn): Van Hise, C. R.: *The Conservation of Natural Resources in the United States*, p. 250 (Macmillan). 11. Read the description of the shearing in *Ramona*, by Helen Hunt Jackson. 12. How does the West compare with the East in number of navigable rivers (Fig. 11)? 13. Let several pupils take the part of land agents, some representing the West, others the South, and let other pupils act the part of immigrants wanting homes. Then see which agents can hold out the greatest attractions. 14. Explain why California receives rain in winter but not in summer. 15. Read the booklet entitled *Glimpses of Our National Parks.* This can be secured from the Government Printing Office, Washington, D. C. 16. Read the bulletin entitled *Irrigation Projects*, published by the United States Reclamation Service, Washington, D. C. 17. Make a collection of advertisements illustrating the products of California. 18. For a

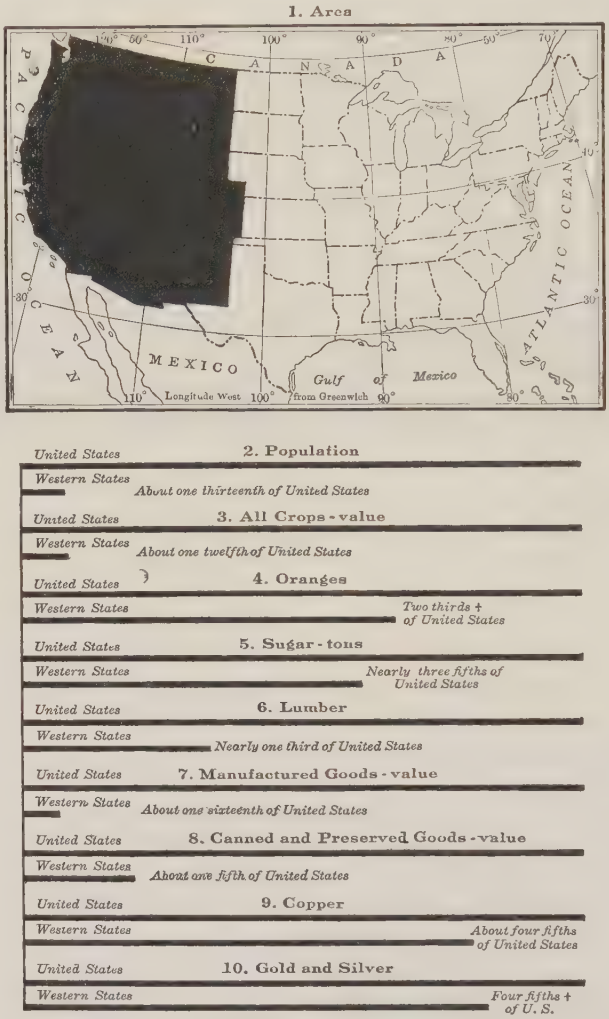


Fig. 188. — The Western States in comparison with the entire United States

description of San Francisco, see Hotchkiss, C. W.: *Representative Cities of the United States* (Houghton Mifflin); Johnson, C.: *Highways and Byways of California*, pp. 166–181 (Macmillan). 19. Write a composition on the work of Luther Burbank. Harwood, W. S.: *New Creations in Plant Life; An Authoritative Account of the Life and Work of Luther Burbank* (Macmillan). 20. Try to obtain railroad folders describing the attractions of the West. Your local ticket agent will help you.

V. Territories and Dependencies of the United States

Political Division	Area in Square Miles	Population	Largest City	Population
Alaska	590,900	55,000	Juneau	3,000
American Samoa	102	8,000		
Guam	225	13,000		
Hawaii	6,450	256,000	Honolulu	83,000
Panama Canal Zone	500	23,000		
Philippine Islands	115,000	10,351,000	Manila	284,000
Porto Rico	3,600	1,300,000	San Juan	72,000
Virgin Islands of the U. S.	130	26,000	St. Thomas	8,000

Our increase of territory. — At the close of the Revolutionary War the United States consisted of thirteen small colonies, extending along the Atlantic coast from what is now Maine to Georgia. Our new nation laid claim also to land far into the wilderness, even to the distant Mississippi. Beyond this was French and Spanish territory, while the whole Mississippi Valley was occupied by Indians.

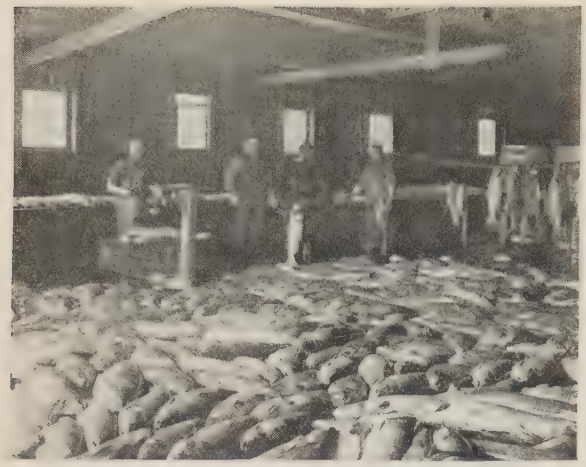
By purchase, by war, and by treaty, we have gained possession of all the other land between the Atlantic and the Pacific which has thus far been described; but our control does not end with the boundaries of the United States proper. In 1867 we obtained Alaska. In 1898 Hawaii was annexed as a territory. In the same year, as a result of a war with Spain, we secured control of Porto Rico, the Philippine Islands, and several small islands in the Pacific Ocean that serve as coaling stations for our navy and merchant vessels. (For their names see Fig. 495.) In 1903 we acquired the Panama Canal Zone (p. 206). In 1917 the Virgin Islands were purchased from Denmark.

Relations between our outlying possessions and other parts of the world. — Porto Rico and the Virgin Islands will be described in connection with the West Indies, of which they form a part (pp. 200–204). The Canal Zone will be discussed in connection with Central America (p. 205). Similarly, the Philippine Islands are closely related to the Orient and the East Indies, and should be studied in connection with those lands (p. 428). Alaska and Hawaii, however, are not so intimately connected with other important countries. They are therefore studied separately in the following sections.

1. Alaska

The value of Alaskan trade to the United States. — Alaska has only recently been regarded as a valuable possession. When the United States paid Russia $7,200,000 for this vast territory in 1867, its value was supposed to lie solely in its fisheries and furs; for it was believed that the climate would prevent other industries and would make travel and transportation of goods impossible. But as a result

Original objections to our purchase of Alaska



© Winter-Pond Co.

Fig. 189. — Scene in a canning factory, Juneau, Alaska

of the exploration of Alaska by greater numbers of people it was found that some of these difficulties did not exist, and that others could be overcome.

The population of Alaska is only 55,000, or about a sixth of the population of Seattle; yet its area is equal to about half that of the United States east of the Mississippi River. An immense territory, therefore, looks to our western ports for its market, and a considerable trade already exists between it and the ports of our Pacific Northwest.

The nature of its exports and imports

The largest exports are fish and metals. In 1918 the fish product was worth $59,000,000; for several years this has slightly exceeded that of the continental United States. If you examine the tins of canned salmon which you buy you will find that many of them were packed in Alaska. Most of the sealskins used in making fur coats come from Alaska. The gold export in 1918 was worth over $9,000,000; since 1880, when gold mining began in Alaska, more than $300,000,000 worth has been mined. Most valuable of all the metals now mined in Alaska is copper, which in 1918 amounted to over $17,000,000, the annual output now, as you can see, being nearly twice that of gold.

This territory, in turn, depends almost entirely upon the United States for its manufactured goods and for a considerable portion of its food. Portland, Tacoma, and particularly Seattle ship north large amounts of machinery, mining supplies, clothing, and food.

Only a beginning has been made in the development of this territory; many known resources have not yet been utilized and others may still be discovered. It is likely that coal and petroleum will become important exports. There are immense forests suitable for the production of paper pulp and lumber. As our own population becomes more dense, extensive use may be made of farm lands in the interior. Therefore Alaska's future value to our country is sure to be far greater than its present value.

Probable future value

Why the southeastern section has been the most developed section of Alaska. — In Fig. 206 locate the southeastern strip of

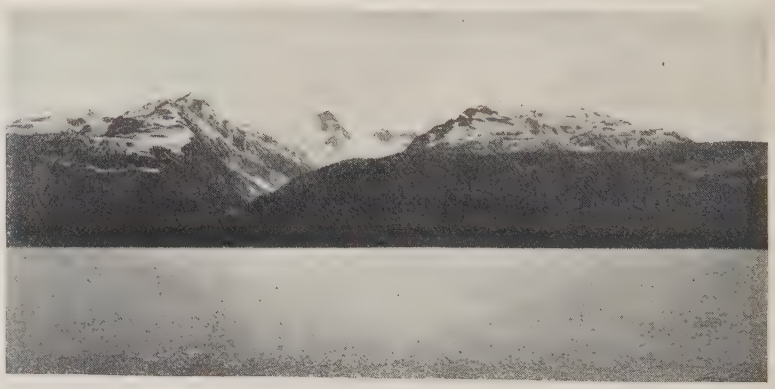


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Fig. 190. — Scene along the Inside Passage

For 1,000 miles north of Seattle, Alaska-bound vessels thread their way among mountainous islands, past forests and waterfalls and glaciers.

Alaska, and its chief town, Juneau. This section enjoys a much milder climate than any other part of Alaska. The prevailing winds from the Pacific give it a climate similar to that of western Washington and Oregon. The temperature seldom goes below zero, and the average for the coldest month is about the same as that for St. Louis. The moist winds striking the mountains on the coast produce an annual rainfall of 80 to 110 inches, causing dense forests on the mountain slopes and luxuriant vegetation elsewhere. The scenery is very beautiful; the higher mountain tops are covered with snow, and glaciers have carved out narrow bays resembling the fiords of Norway (p. 345). Because of the climate and scenery, this is a favorite region for tourists. From Seattle to Skagway a remarkable *Inside Passage* lies between the mainland and a wall of islands. Trace it in Fig. 206. How would you expect the island chain to affect the pleasures of the voyage?

The attractions of its climate and scenery

The Inside Passage is also the beginning of one of the chief routes to the interior of Alaska. From Skagway a short railroad leads over the mountains to the upper limit of navigation on the Yukon River, the remainder of the route to the interior being by boat down that river.

The mild climate of the southeastern coast favors the raising of food crops. But farming is confined entirely to the small river valleys, for the remainder of the district is very mountainous. Even in the fertile valleys, rain and fogs deprive the plants of much of the sunlight necessary for growth, so that crops sometimes fail to ripen and grains are stunted.

Its agricultural possibilities

The earliest gold discoveries in Alaska were along the coast, where mining camps were established both on the mainland and on the islands. The famous mines at Treadwell, near Juneau, have the largest stamp mills in the world for crushing ore, and immense mills of a more modern type are located just across Gastineau Channel at Thane.

The value of its exports

The waters along the coast also contain valuable resources, for the Gulf of Alaska is one of the richest fishing grounds in the world for salmon, cod, herring, and halibut. Thousands of fishermen sail each season from our Western coast for the catch. Kodiak Island, south of Cook's Inlet, and Ketchikan are important centers of the salmon industry.

Fig. 191. — The Yukon River

The natives along the Yukon and its tributaries depend largely upon the salmon fisheries for their livelihood. Salmon are shown here, drying on racks. Note the log cabin at the left.

The promise of another section to be more important. — The southern half of the main portion of Alaska seems likely to outstrip the southeastern extension in importance. Locate in Fig. 206 the section extending from the Copper River Valley on the east to Cook's Inlet and Mt. McKinley, the highest mountain on the continent, on the west; and north as far as Fairbanks.

The location and resources of this section

This area surpasses any other part of Alaska in wealth and variety of products. Practically all of Alaska's copper is mined in the Copper River Valley. Much of the gold comes from the Tanana Valley, in which Fairbanks is located. The two most important coal fields on the west coast of the continent are in this section, and petroleum also has been discovered here. Here also on the coast are important fisheries.

Fig. 192. — Cutting grain near Fairbanks

Successful experiments have been made with varieties of wheat that mature in the short growing season at this high latitude. Note the heavy growth of white birch.

Though agriculture is still in the experimental stage, the most promising farm lands in Alaska are in this section. The river valleys are fertile and level; and, although the winters in the interior are long and extremely cold, the shortness of the growing season, from May to September, is partly balanced by the length of the days. At Fairbanks the sun shines at this season from eighteen to twenty-one hours daily, and throughout the summer months it is light even at midnight; plants therefore mature very rapidly. Potatoes and other root crops, garden truck, blueberries, and cranberries flourish, though the great distance from world markets makes large exports of these products unlikely. Alaskan potatoes and berries, however, have been sold in Seattle since 1918, and Siberia also promises to afford a market. How would that country be reached from Alaska? Among the grains, oats, rye, buckwheat, and spring wheat can be raised. There is much excellent pasturage, for grass grows rapidly. If hardy varieties of sheep and cattle, such as those of northern Europe, are extensively introduced, the raising of live stock may become important.

The short railroad up the Copper River has until recently been the only important one of this section; consequently it has been impossible to develop the many resources at a distance from it without great expense. For instance, it has been cheaper to import lumber from Puget Sound than to draw on the forests near by; and many of the farm lands have been so far inland as to be of little use. But our government is now building a railroad

Provisions for transportation

from Seward, on the coast, to Fairbanks. Locate it in Fig. 206. More than four fifths of this railroad had been completed in 1920. It will probably be of the greatest importance in developing the interior of the territory. It may also be the future route to the Yukon Valley, diverting to itself much of the traffic that is now shipped by the Yukon River, as previously indicated (p. 169). If you were shipping goods from Seattle to Fairbanks would you choose the route by way of the Yukon, or, when it is completed, by way of the new railroad? Why?

Fig. 193. — Fairbanks, Alaska
This view was taken from the belfry of the northernmost high school in the western hemisphere.

Prospect for northern and western Alaska. — The great plains of northern and western Alaska are swept by cold winds from the Arctic Ocean and Bering Sea and have a severe climate. In the northern part the Arctic summer lasts but six weeks; only Eskimos and Indians live there. The most valuable region is the west coast on Seward Peninsula, where some of the richest gold discoveries in the territory have been made. This section is bleak and desolate except for two or three months in summer, when the sun shines most of the twenty-four hours each day. Ocean traffic is possible only in summer; in winter the route for travel southward is by sled to Nenana (Fig. 206), and thence by railroad and sled to the open ports on the Gulf of Alaska. Mention some of the difficulties that would be encountered on such a trip. Yet with the first discovery of gold on the Seward Peninsula, Nome was settled and sprang into a thriving town in a single year. Compare its latitude with that of Fairbanks. Estimate the distance of both from the Arctic circle. How would conditions of living in either place differ from those to which you are accustomed?

Fig. 194. — Traveling with dog teams
Dog teams can be driven where horses cannot go because of the cold and the deep snow.

Measures of the government for protection and development of Alaska. — Until 1912 Alaska was governed entirely from Washington; but in that year it was organized into a territory with its own legislature, which with certain restrictions, now makes the laws. It also elects a delegate to our Congress. Thus our former disadvantage of governing Alaska from a great distance and not always knowing its real needs has been in some measure overcome.

Some of the most important laws passed by our government have been for the pro-

tection of its natural resources. Since our purchase of Alaska, the killing of fish and game has been enormous and wasteful. Whaling was formerly an important industry about Point Barrow, the most northern point; but now the few remaining whales must be sought far out in the Arctic Ocean. So many seals were killed that the important seal industry of the Pribilof Islands in Bering Sea was nearly destroyed. Locate these islands. The government now allows only one company to take fur seals there, and this may take only a limited number each year. The salmon industry is being promoted by government fish hatcheries.

Fig. 195. — Fur seals on one of the Pribilof Islands

Every year the Bureau of Fisheries takes a census of the seals. In 1919 there were 496,000 seals under government protection. Estimate the number of seals in the picture. What proportion is it of the total seal population?

Caribou formerly furnished the natives of the far North with meat; but when the white man came, these animals were slaughtered faster than they could multiply. The government, however, has been very successful in introducing reindeer from Siberia to take their place. The reindeer furnish milk and meat, and there is even a possibility that reindeer meat may become an important export to our Pacific ports. The natives make the skin and bones into clothes, tents, utensils, and sleds.

The government has taken control of the coal lands and oil fields in order to guard them against waste or misuse. It also protects the valuable forests on the southern and southeastern coasts.

Farming has also been developed by the government agricultural experiment stations, one of which is located in each of the four different *judicial districts* into which Alaska is divided. At these stations many of the products already mentioned were first raised.

Facts to be especially well fixed. — 1. The natural divisions of Alaska and the climatic conditions of each; opportunities for agriculture in each. 2. Location of Juneau; Mt. McKinley; Fairbanks; Kodiak Island; Pribilof Islands; Seward; Seward Peninsula; Nome. 3. Course of Yukon River. 4. Products of Alaska.

Problems for independent study. — 1. The population of Juneau increases considerably in the winter. How do you explain this fact? 2. How does a mining camp in the Fairbanks or Nome district differ from one in the western portion of the United States? Sunset Magazine, 1916, vol. 37, pp. 33–35, 94–97; Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 191–198 (Ginn); Higginson, E.: *Alaska*, pp. 514–528 (Macmillan). 3. Write a composition on the importance of transportation routes in the development of Alaska. National Geographic Magazine, 1915, vol. 28, pp. 567–589; 1914, vol. 25, pp. 183–225. 4. What attractions has Alaska for immigrants? Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 184, 194, 313–315; Adams, C. C.: *A Textbook of Commercial Geography*, pp. 85–89 (Appleton); National Geographic Magazine, 1909, vol. 20, pp. 585–593; 1912, vol. 23, pp. 424–494. 5. Write a paper on Seward's farsightedness in the

purchase of Alaska. Carpenter, F. G.: *North America*, Chapter XL (American Book); National Geographic Magazine, 1916, vol. 29, pp. 547–549; Trotter, S.: *Geography of Commerce*, pp. 172–174 (Macmillan). 6. Compare Alaska in area, population, and resources with the Scandinavian Peninsula (pp. 344–349).

2. The Territory of Hawaii

Value of the Hawaiian Islands to the United States. — In 1898, when the United States acquired the Philippine Islands at the close of the Spanish War, it became important for us to have a coaling and repair station for our ships in the middle of the Pacific. This is one of several reasons why the United States in that year annexed the Hawaiian Islands, which had more than once requested union with us. Estimate in Fig. 495 the distance from San Francisco to Manila. What is the distance from San Francisco to Honolulu? Only the most modern ships can make the long trip entirely across the Pacific without renewing their supply of fuel on the way. Many of the larger vessels can carry no more than 800 tons of coal; but as sixty or seventy tons may be burned each day, this supply would last less than two weeks, while the voyage requires more than three weeks. Therefore, the government needs a place along the route where it can store large quantities of coal or oil.

Their value for commerce and defense

On such a long voyage, also, ships are liable to have accidents that call for extensive repairs. These islands have been of value to us in both these respects. A dry dock capable of handling the largest merchant ships on the Pacific as well as our largest battleships has been constructed by our government at Pearl Harbor, near Honolulu. To-day ships can be taken out of the water and repaired at this distant island as well as at one of our great shipbuilding ports.

Courtesy of Pacific Ports

Fig. 196. — A portion of Honolulu harbor

Honolulu is visited by many steamers in their transpacific voyages. Pearl Harbor, a United States naval base, is only a few miles distant. Name one of the mountains by reference to Fig. 453.

However, these islands are of far greater importance to us as a naval base for use in war than as a coaling and repair station. In case of war our ships can now protect our Pacific coast from this base, and at the same time prevent an enemy from using the islands as a base of operations. With this end in view the United States has fortified Pearl Harbor.

The annexation of Hawaii was desirable not only for purposes of defense but also

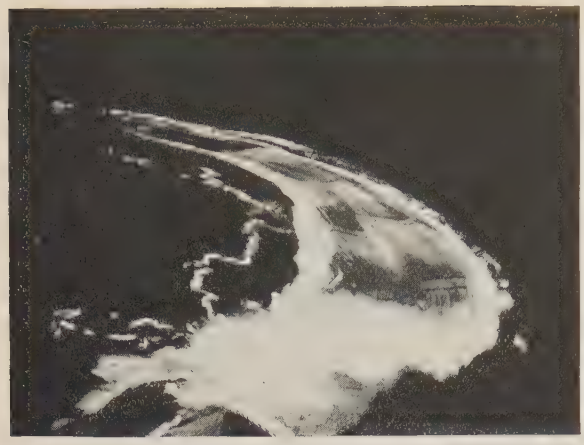

Fig. 197. — A night view of the glowing lava in Kilauea

because of their value for agriculture. The soil requires fertilizing, being composed mostly of lava and volcanic ash. The islands are the tops of a range of mountains thrown up as lava from the bottom of the sea. These mountains have their bases 12,000 to 18,000 feet below the surface of the water and some of them tower more than 13,000 feet above the surface. Some of the greatest active volcanoes of the world are on the island of Hawaii, the largest in this archipelago. Mauna Loa, the highest (13,675 feet), is inactive except at intervals; in 1919, however, lava broke forth and flowed to the sea, thirty miles away. Kilauea (4,000 feet), on the island of Kauai, is active all the time. The crater (Fig. 197), which can be reached by automobile, is one of the most spectacular sights in the world.

Their value for agriculture

1. How the soil and climate favor agriculture

These islands lie just within the tropics and are surrounded by the warm waters of the Pacific; they are therefore well adapted to tropical products. There is little variation of temperature from day to day, or even from season to season; so that two, and sometimes three, crops are produced each year. The warm trade winds bring abundant rainfall to the windward slopes of the mountains, and the vegetation is luxuriant and brilliant in coloring. From what direction do these winds blow? But the leeward slopes and the lowlands near the coast get little moisture. Why? (See p. 236.) About two thirds of the cultivated land must be irrigated. Although some of the water for irrigation must be pumped with imported coal — for the islands have none — farming is still a profitable venture, because crops grow so well in the rich soil and warm climate.

Sugar is the most important product. Since long before the islands became a territory of the United States, their sugar was shipped to us free of duty, which gave Hawaiian sugar an advantage over that from other countries. In consequence, this industry has greatly prospered. The sugar plantations are among the best equipped in the world, having irrigation canals, sugar mills, and railroads for the transportation of the cane. Unlike that of Louisiana, the sugar cane in Hawaii is allowed to grow until it matures, because there is no frost. This requires about eighteen months. A fire is then run through

2. Their principal products

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Fig. 198. — A field of pineapples in Hawaii
Note how fully the slopes are kept under cultivation.

it to burn the dead leaves and weeds. Several crops are grown from the same roots before replanting is necessary. On the best-watered lands the yield has been as high as 100 tons to the acre, by far the highest in the world. How does that compare with the yield in Louisiana (p. 107)? Eighty per cent of the Hawaiian exports is sugar, practically all of which is sent to the United States (p. 161).

Pineapples are second in importance, 5,000,000 cases being produced in 1919. Coffee and bananas are produced in small quantities, and attempts are being made to increase the output of rubber.

The mixture of races. — Most of the plantations on the islands are owned by Americans. They have had to import labor from other countries because the natives are few. Only one tenth of the population is native; two fifths are Japanese; the remainder are Chinese, Portuguese, Filipinos, Spaniards, Koreans, and Americans.

Facts to be especially well fixed. — 1. Latitude of this archipelago, and its distance from San Francisco. 2. Its climate. 3. Its chief products.

Problems for independent study. — 1. Make a drawing to show the appearance of the Hawaiian mountains both above and below the surface of the sea. 2. Compare these islands with Florida and California as a winter resort. Adams, C. C.: *A Textbook of Commercial Geography*, pp. 170–173 (Appleton); Wilder, M. M.: *Smiling 'Round the World*, Chapter III, on *Hawaii* (Funk & Wagnalls); Johnson, C.: *What to See in America*, pp. 182–203, 456–494 (Macmillan). 3. Where would you expect coal to be obtained for these islands? 4. Why is the importation of certain Hawaiian fruits into the United States forbidden? National Geographic Magazine, 1914, vol. 25, pp. 344–358; Trotter, S.: *Geography of Commerce*, pp. 166–169 (Macmillan). 5. Explain why these islands desired to become a part of the United States. (See p. 174.) 6. Read Baldwin, C. W.: *Geography of the Hawaiian Islands* (American Book).

VI. Canada and Newfoundland

1. Canada

	Area in Square Miles	Population	Largest City	Population
Alberta	255,300	497,000	Calgary	57,000
British Columbia	395,600	400,000	Vancouver	175,000
Manitoba	251,800	554,000	Winnipeg	163,000
New Brunswick	28,000	352,000	St. John	43,000
Nova Scotia	21,400	492,000	Halifax	47,000
Ontario	407,300	2,799,000	Toronto	510,000
Prince Edward Island	2,200	94,000	Charlottetown	11,000
Quebec	706,800	2,380,000	Montreal	700,000
Saskatchewan	251,700	833,000	Regina	40,000
Yukon Territory	207,100	9,000	Dawson	3,000
Northwest Territories	1,242,200	18,000		
Total for Canada	3,769,400	8,428,000		

Questions. — 1. Which of the above areas do you suppose to be rough estimates? Why? 2. Compare the density of population of the Northwest Territories with that of Alaska; of Prince Edward Island. 3. Why do you suppose that no "largest city" is listed for the Northwest Territories?

The great area of Canada and some of the limits to its usefulness. — Canada has an area larger than that of the United States including Alaska and our other dependencies, and nearly equal to that of all the countries

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Fig. 199. — Massive Mountain Range, Alberta

The Canadian Rockies are famous for their mountain scenery. Though the summits are in general lower than in the western part of the United States, the mountains are often more rugged and the snow line is lower.

of Europe put together. Yet it can never be as important as its area suggests. Fig. 12 shows the part made nearly useless by the cold. There are few trees, as we have seen (p. 13), north of the line where the average temperature in July is only 50°. That region can be used only for fishing and hunting and for reindeer grazing. About what portion of the entire area of Canada does it include?

The Ice Sheet that once covered a large part of North America did its greatest damage in the region now included in southern Canada. It not only caused thousands of lakes here by leaving the surface very irregular, but it scraped southward much of the soil from one large portion of the country. In Fig. 8 you can see the area that suffered in this way. Trace the southern boundary of the area of thin soil. In many places the rock lies bare, and only here and there where the soil has been caught in pockets can agriculture flourish. Vast forests now occupy this region, which on account of its thin soil is unlikely to be denuded of its timber to permit agriculture.

This area of thin soil includes fully half of Canada. When this is added to the portion unsuited for agriculture because of cold, less than a fourth of the total remains. Much even of this remainder can never be very productive, owing to the mountains and plateaus. Locate some of these, both in the east and in the west. Only about one fifth of the total

area of Canada can be considered as arable land. This is an enormous amount, however, and a far greater area than is possessed by many other countries.

The settled part of Canada and how it is divided. — Fig. 10 shows the part of Canada that has been settled. Note how long and narrow it is, extending from ocean to ocean. Estimate its length.

This region is naturally divided into four parts. The state of Maine extends so far north as almost to cut off from Quebec the three Atlantic provinces of New Brunswick, Nova Scotia, and Prince Edward Island. These form a group by themselves called the Maritime Provinces. The valley of the St. Lawrence and the thickly settled part of Ontario are separated from Manitoba by a vast forest growing on the thin soil north of Lakes Huron and Superior (Fig. 14). Quebec and Ontario may therefore well be studied together. The Rocky Mountains form a lofty wall between Alberta and British Columbia, dividing western Canada into the Prairie Provinces of Manitoba, Saskatchewan, and Alberta, and the mountainous province of British Columbia.

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Fig. 200. — Fish prepared for smoking, Prince Edward Island

What are the three common ways of preserving fish?

The Maritime Provinces. — The Maritime Provinces contain some of the oldest settlements in North America. The northwestern part of Nova Scotia is often called the Land of Evangeline because it is the Acadia that Longfellow so beautifully pictures in his story of Evangeline. The whole region resembles New England in surface, climate, and farm products. While much of the surface is rugged, there are many fertile valleys that produce grains, apples, such vegetables as potatoes and turnips, and live stock. Pine forests like those of Maine extend over this region also, and a great amount of lumber is produced. Fish are abundant in the surrounding waters; their nearness to the Newfoundland fishing banks gives the fishermen of this region an important advantage over those of New England who go there for cod.

Advantages they enjoy

In another respect these provinces have a great advantage over New England. While the latter lacks both coal and iron ore, Nova Scotia has an abundance of both, as well as of limestone — the three materials necessary for iron manufacture. Nova Scotia has blast furnaces at Sydney and other points near by, and supplies much coal to the eastern part of Canada. Indeed, coal

can be shipped very cheaply from that province to Boston, so that it can compete with Pennsylvania in supplying the factories of New England with fuel. In return, New England's manufactures are especially welcome in these provinces because the Canadians of this section are still mainly interested in agriculture.

Halifax, however, the leading city, is an important shipbuilding center. This city has a magnificent harbor and is several hundred miles nearer England than any of our own large ports. In Fig. 495 estimate how much nearer it is to Liverpool than is New York.

In spite of such advantages, these provinces have not greatly increased in population during recent years. Halifax at the time of the last census had a population of less than 50,000, and Prince Edward Island had even lost in population during the preceding ten years. Their nearness to Europe is not in every respect a help. During the winter months, to be sure, it gives them an advantage; for when the St. Lawrence River is frozen over, freight and passengers bound abroad go to St. John and Halifax by rail to take ship. They also enter Canada from abroad by the same route. But in the summer months they do not have to pass through these provinces in going to and from the interior, as they must pass through New York in going to or from Chicago or the West. For that reason, business men, visitors, immigrants, and freight have passed them by.

Why they have not increased more rapidly in population

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Fig. 201. — A lake vessel on the Welland Canal

Find the Welland Canal on Fig. 32. Between what lakes does it extend? How much lower is Lake Ontario than Lake Erie?

Why Ontario and Quebec are most thickly settled. — The leading reason for the denser population in parts of Quebec and Ontario is the large area of deep, fertile soil. A narrow strip of land on either side of the St. Lawrence and the southernmost portion of Ontario is especially fertile. Grains and vegetables are grown here extensively, and cattle and dairy products are abundant. The area nearly surrounded by Lakes Ontario, Erie, and Huron resembles western New York and northern Ohio in its advantages for fruit growing, and is noted particularly for its grapes, apples, and peaches.

Their advantages for agriculture

The excellent waterways have also exerted great influence. The Great Lakes and St. Lawrence River form the finest interior water route in the world (p. 90). At first, rapids in the river and the difficulty of getting from one

Their conveniences for transportation by water

lake to another limited its use; but canals now overcome these obstacles. The Soo Canal leads from Lake Superior to Lake Huron; the Welland Canal from Lake Erie to Lake Ontario; and other canals lead around the rapids in the St. Lawrence River.

This route has one advantage over that from Duluth to New York City. While the new Barge Canal connecting Buffalo with the Hudson River permits the use of boats drawing ten feet of water, this Canadian waterway is large enough for boats drawing twelve feet. Small ocean vessels can, therefore, reach Port Arthur or Fort William. The larger ocean vessels can go up the river no farther than Montreal, so that this city is the place where most of the commodities bound east or west are transferred from one kind of vessel to another, or *transshipped*. Thus Montreal, like New York, is an important gateway to Europe, which helps to explain why it is the largest city in Canada. Compare it in population with the city of Quebec. What other important Canadian cities are located upon this waterway?

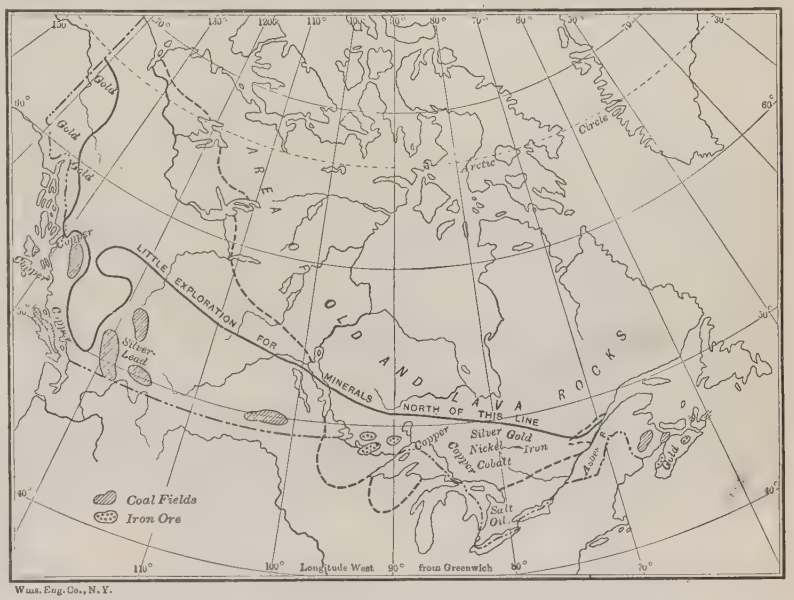

Fig. 202. — Distribution of minerals in Canada

Note how small an area has been explored for minerals. The metals occur chiefly in the area of old and lava rocks.

Fig. 202 shows how rich Ontario is in minerals. The nickel deposits are the largest in the world, and large quantities are shipped to the United States and other countries. Silver is mined extensively in northern Ontario, and in Quebec there are several important asbestos mines. What are the chief uses of asbestos?

Their advantages for mining and manufacturing

The most necessary mineral, however, is lacking in these two provinces. Can you name it? Nevertheless, manufacturing is rapidly developing. With vast forests near at hand, many sawmills are to be expected. Ottawa produces a great amount of lumber, and, together with Montreal and Toronto, manufactures large quantities of furniture. Shipbuilding is an important industry not only at Halifax but also at Montreal and at Toronto and several other cities on the Great Lakes. Pulp wood for paper is another important product. While coal has to be imported, a large amount of electric power is obtained both from Niagara Falls and from the rivers that descend from the Laurentian Highland to the St. Lawrence. Textiles, particularly cotton and woolen goods, and food products—such, for example, as meats, fish, and fruits—are extensively prepared for market. These two provinces manufacture far more goods than all the others together.

As might be expected, Ontario and Quebec

must import many manufactured goods. They also require coal with which to smelt their ores and heat their houses, cotton for their textile mills, citrus fruits, and corn for their live stock. On the other hand, they can export lumber, pulp wood, some kinds of fruits, butter and cheese, and other farm products in large quantities. We, in turn, can export to them large quantities of manufactured articles, as well as coal, cotton, corn, and semi-tropical products in return for their surplus products. Thus a great amount of trade takes place to the advantage of both nations. The distances, too, are not great between large cities north and south of the boundary. Estimate the number of miles from New York to Montreal (Fig. 32). How does it compare with the number from New York to Pittsburgh? What is the distance from Buffalo to Toronto? From Hamilton to Detroit?

Favorable conditions for trade with the United States

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Fig. 203. — Montreal from Mount Royal

Note the St. Lawrence River in the background and the great bridge crossing it. The river is open except for about four months in winter. What river enters the St. Lawrence here (Fig. 206)?

Canada has much more trade with the United States than with any other country, not excepting England. These are some of the reasons why Ontario and Quebec are the most populous provinces. Compare their populations with those of the other provinces (p. 175).

The most rapidly growing part of Canada. — The most rapidly growing parts of Canada are the two western sections (p. 177), corresponding to our states from the Dakotas to Washington. During the past few years immigrants have been pouring into these provinces. In 1913, 139,000 people emigrated from the United States to Canada, most of whom settled in the Prairie Provinces. The population of Saskatchewan in 1901 was only 91,000, while in 1919 it was estimated to be 833,000; and Alberta has grown almost as fast.

Their attractions for immigrants

It has been the possibility of raising wheat that has attracted most of the settlers to this region. As one travels across Manitoba, Saskatchewan, and Alberta in July one sees wheat on all sides, even more of it possibly than is found in our own states just south of the border. Hundreds of grain elevators give evidence that this is one of the greatest wheat regions of the world.

Their agricultural possibilities

At first wheat was almost the only crop, but now mixed farming is becoming common. Oats, barley, flax, and rye, grains that are more hardy than wheat, are grown, particularly in the northern districts, and cattle are rapidly increasing in number.

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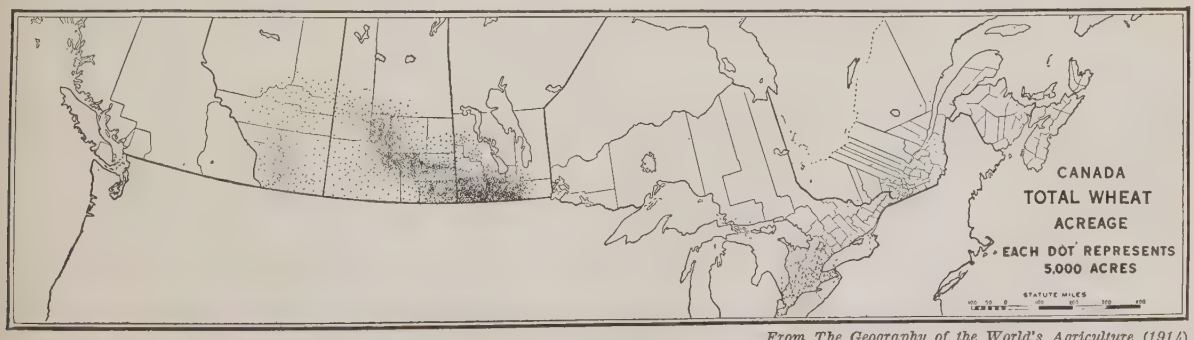
Fig. 204. — Pulp mills and iron works at Sault Ste. Marie, Ontario

The Canadian "Soo" is well located for the manufacture of paper. Vast forests are near by, there is an abundance of water power, and the lake water is always free from sediment. There are also good opportunities for shipping the product.

Its varying amount of rainfall, and the results

The main difficulty, aside from the possibility of frost, is lack of moisture. Where the damp westerlies from the Pacific Ocean strike the Coast Range in British Columbia, the annual rainfall is ninety inches or more, which favors the growth of a mighty forest, as well as of hay and vegetables. The most valuable and most common tree is the Douglas fir, which sometimes attains a height of nearly 300 feet and a diameter of fifteen feet. The westerlies leave large areas with little rainfall, however, between the Coast Range and the Rockies; and beyond the latter in western Alberta there are only from ten to fifteen inches of rain. In both regions dry farming and grazing are common, as in some of our Western States, and irrigation systems are being developed both in the Fraser Valley of British Columbia and in southern Alberta.



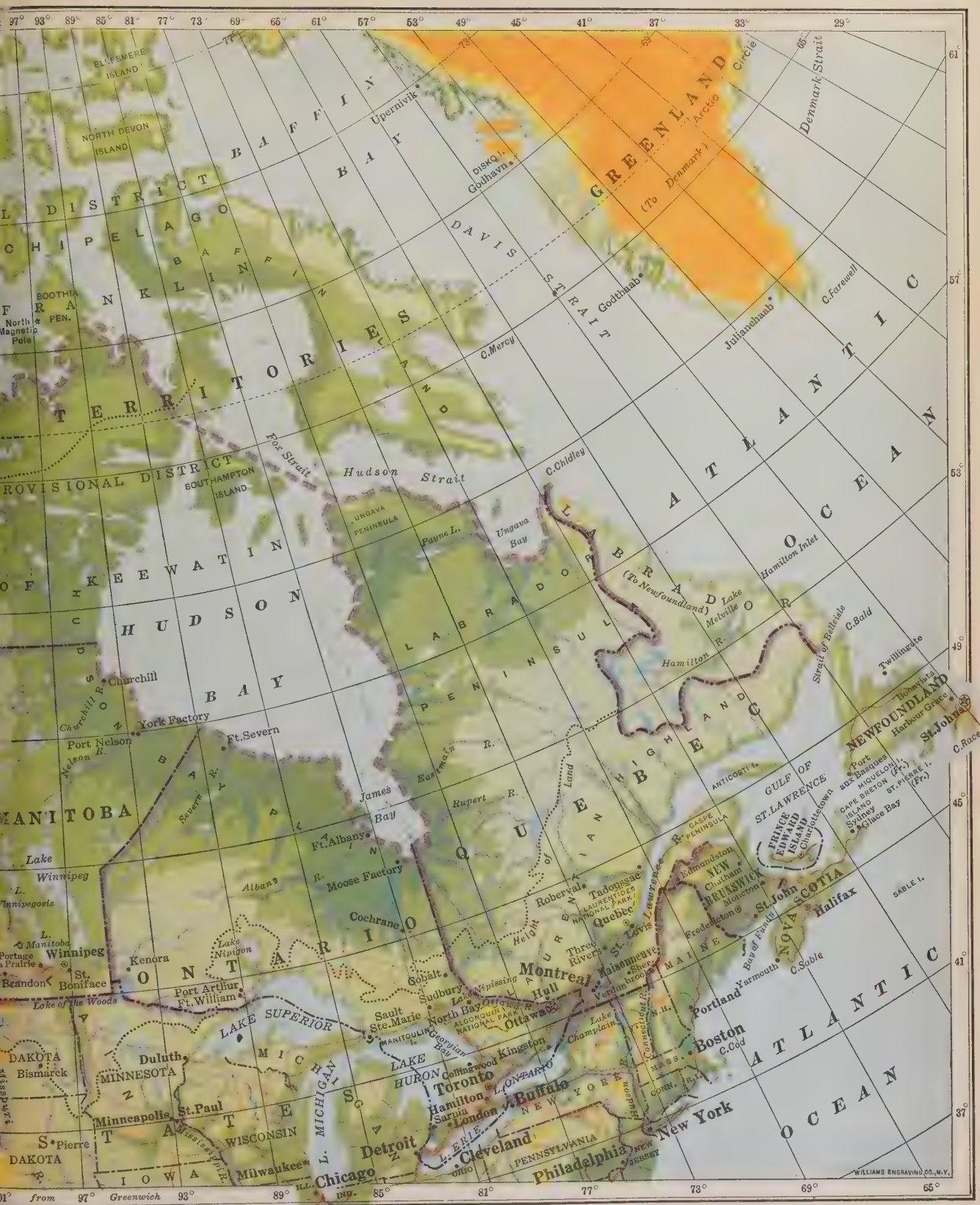
From The Geography of the World's Agriculture (1914)

Fig. 205

In what three provinces does most of the wheat of Canada grow? What states in our country lie to the south of these three provinces?

CANADA
NEWFOUNDLAND
AND ALASKA
PHYSICAL AND POLITICAL MAP
Scale of statute miles
0 50 100 200 300 400
Capitals of countries
Capitals of provinces
Divides or Watersheds
Railroads
Canals
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
ALEUTIAN ISLANDS
Same scale as main map
BERING SEA
PACIFIC OCEAN
ARCTIC OCEAN
YUKON
ALASKA
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
NORTHWEST PROVISIONAL DISTRICT
MACKENZIE
OREGON
IDAHO
MONTANA
WYOMING
Longitude 175° East 179° 180° 177° Longitude 173° West from 169° Greenwich 165°
Longitude 137° 133° 129° 125° 121° 117° 113° 109° Longitude 105°

Fig. 206


GREENLAND
(To Denmark)
Arctic Circle
Denmark Strait
BAFFIN BAY
DAVIS STRAIT
ATLANTIC OCEAN
ELLESMERE ISLAND
NORTH DEVON ISLAND
BAFFIN ISLAND
Upernivik
Godhavn
DISKO I.
Godthaab
Julianehaab
C. Farewell
C. Mercy
C. Chidley
Hudson Strait
Fox Strait
SOUTHAMPTON ISLAND
UNGAVA PENINSULA
Ungava Bay
Payne L.
Hamilton Inlet
Lake Melville
(To Newfoundland)
LABRADOR PENINSULA
LABRADOR HIGHLAND
Strait of Belleisle
C. Bald
Twillingate
NEWFOUNDLAND
St. John's
C. Race
Bonavista
Harbour Grace
GULF OF ST. LAWRENCE
ANTICOSTI I.
Port aux Basques
MIQUELON I. (Fr.)
CAPE BRETON ISLAND
Sydney
ST. PIERRE I. (Fr.)
Glace Bay
PRINCE EDWARD ISLAND
Charlottetown
GASPE PENINSULA
NEW BRUNSWICK
Edmundston
Chatham
Moncton
St. John
Fredericton
NOVA SCOTIA
Halifax
SABLE I.
Bay of Fundy
Yarmouth
C. Sable
MAINE
Portland
Boston
C. Cod
MASS.
R.I.
CONN.
NEW YORK
New York
NEW JERSEY
PENNSYLVANIA
Philadelphia
Cleveland
OHIO
Detroit
Chicago
ILL.
IND.
Milwaukee
WISCONSIN
Minneapolis
St. Paul
Duluth
MINNESOTA
IOWA
S. Pierre
DAKOTA
Bismarck
DAKOTA
Toronto
Buffalo
Hamilton
Sarnia
London
Collingwood
Kingston
L. ONTARIO
L. ERIE
LAKE HURON
LAKE MICHIGAN
LAKE SUPERIOR
Georgian Bay
MANITOULIN I.
Sault Ste. Marie
Port Arthur
Ft. William
Lake of the Woods
Kenora
Lake Nipigon
Winnipeg
St. Boniface
Brandon
Portage la Prairie
Lake Manitoba
Lake Winnipegosis
Lake Winnipeg
Cobalt
Sudbury
Lake Nipissing
North Bay
Ottawa
ALGONQUIN NATIONAL PARK
Cochrane
Moose Factory
Albany R.
Ft. Albany
James Bay
Severn R.
Churchill R.
Churchill
York Factory
Port Nelson
Nelson R.
Ft. Severn
Eastmain R.
Rupert R.
Land of Labrador
Roberval
Tadoussac
LAURENTIDES NATIONAL PARK
Quebec
St. Lévis
Three Rivers
Maisonneuve
Sherbrooke
Montreal
Hull
Verdun
Lake Champlain
Connecticut R.
Height of Land
HUDSON BAY
KEEWATIN
TERRITORIES
PROVISIONAL DISTRICT
BOOTHIA PEN.
North Magnetic Pole
FRANKLIN
ARCHIPELAGO
DISTRICT
Mississippi R.
Missouri R.
Red R.
Albany R.
Severn R.
Nelson R.
Churchill R.
Hudson
Connecticut R.
Lake Champlain
Georgian Bay
Bay of Fundy
Gulf of St. Lawrence
Lake Winnipeg
Lake Winnipegosis
Lake Manitoba
Lake of the Woods
Lake Nipigon
Lake Superior
Lake Huron
Lake Michigan
Lake Ontario
Lake Erie
Hudson Bay
Hudson Strait
Davis Strait
Baffin Bay
Labrador Peninsula
Labrador Highland
Gaspe Peninsula
Prince Edward Island
Nova Scotia
New Brunswick
Newfoundland
Maine
Mass.
R.I.
Conn.
New York
New Jersey
Pennsylvania
Ohio
Ill.
Ind.
Wisconsin
Minnesota
Iowa
Dakota
Manitoba
Ontario
Quebec
Keewatin
Provisional District
Territories
Franklin
Boothia Pen.
North Magnetic Pole
Ellesmere Island
North Devon Island
Baffin Island
Southampton Island
Ungava Peninsula
Ungava Bay
Payne L.
Hamilton Inlet
Lake Melville
Labrador Peninsula
Labrador Highland
Strait of Belleisle
Gulf of St. Lawrence
Anticosti I.
Prince Edward Island
Gaspe Peninsula
Nova Scotia
New Brunswick
Newfoundland
Sable I.
Miquelon I. (Fr.)
St. Pierre I. (Fr.)
Cape Breton Island
Port aux Basques
Bonavista
Harbour Grace
St. John's
C. Race
C. Farewell
C. Mercy
C. Chidley
C. Bald
C. Sable
C. Cod
Twillingate
Julianehaab
Godthaab
Upernivik
Godhavn
Disko I.
Greenland
(To Denmark)
Arctic Circle
Denmark Strait
Davis Strait
Baffin Bay
Atlantic Ocean
Hudson Strait
Fox Strait
Hudson Bay

Questions on Fig. 206. — 1. Trace the Continental Divide between the Atlantic and the Pacific oceans; between the Arctic and the Atlantic; between the Arctic and the Pacific. 2. Trace the Inside Passage from Seattle to Skagway. 3. Compare the number of cities and railways in southern Alberta with that in the same latitude in Quebec. How do you account for the difference? 4. How does the Laurentian Highland compare in altitude with the Appalachian Highland? 5. If you wish to look up smaller places in Ontario and Quebec than are shown here, consult Figs. 32 and 501.

What does Fig. 13 show with reference to the rainfall in the western section of Canada?

Why conditions in these provinces are surprisingly favorable to agriculture

For many years it was commonly supposed that western Canada was too cold for farming and grazing; but this supposition has been found to be incorrect. The influence of the westerlies in producing a mild climate in British Columbia is easily understood; but how very mild they make it is seldom appreciated. In what temperature region is this section of Canada (Fig. 12)? The Pacific coast of North America is many degrees warmer than the Atlantic coast in the same latitude. In consequence, there is seldom any frost even in January at Victoria and the flowers in the gardens there often bloom through most of the winter, although that city lies farther north than Quebec.

1. Influence of the west winds

The greater the distance from the ocean, the more extreme are the summers and winters, and in most districts east of the Rockies, as in parts of the Great Plains in our own country, nothing enables the farmer to survive during the winter except warmly built houses and barns, and plenty of fuel. In what temperature region is most of Alberta (Fig. 12)? At Edmonton in Alberta the temperature frequently falls to 45° below zero.

Two features of the plateau region, however, are greatly in the farmer's favor. One is the Chinook winds (p. 147) that descend the eastern slopes of the Rockies and spread far out over the plains. In winter they melt the snow so rapidly that they are known as snow-eaters; and they are so frequent that they allow snow to remain on the ground only for short periods. That is fortunate for the farmer, because the drier districts are given over to grazing and without such exposure of the pasturage the cattle and sheep would perish. Owing to these winds the winters on Peace River in northern Alberta are far milder than might be expected and the springs are earlier. All the grains and vegetables that are raised about Toronto will ripen at Dunvegan in Alberta, which is more than 700 miles farther north (Fig. 206). The influence of these winds diminishes, however, toward the east, and Saskatchewan and Manitoba are well beyond their reach.

2. Influence of the Chinook winds

The other fact that greatly favors the farmer is the long period of sunlight each day during the summer. Sunlight, as you know, is necessary to the growth of plants. Accordingly, when they receive it nearly eighteen hours out of the twenty-four, as they do in midsummer in these provinces, they mature with astonishing speed. We have already seen how long hours of sunlight affect vegetation in Alaska (p. 170). Experiments have shown that many plants will grow twice as rapidly during an eighteen-hour day as during a twelve-hour day. Thus the long day helps to make up for the short summer season and the great slant of the sun's rays.

3. Effect of long hours of sunlight

The four western provinces are chiefly engaged in the production of food and raw materials for manufacturing. The prin-

cipal products from the Prairie Provinces are wheat and meat. British Columbia grows apples extensively, and other fruits such as are common in Washington (p. 141). Its supply of timber is vast; and the same can be said of its fish. Since 1912 it has surpassed Nova Scotia in its fisheries. The salmon often so choke the small streams that they may be tossed out upon the banks with pitchforks. The output of coal, also, is important, surpassing that of all the other provinces except Nova Scotia. The production of these various commodities far exceeds their home consumption and affords large quantities for export; but manufacturing is little developed.

Opportunities for trade between these provinces and the United States

On the other hand, our Pacific coast states need cheap coal badly. Lumber is becoming more and more expensive in the United States because our forests have been so depleted. Food of all sorts must be imported more and more, as we manufacture more extensively, and our manufactured articles, such for example as clothing and farm machinery, are just the things that these provinces must import. Thus the conditions are very favorable for commerce between them and us, and for close friendship. In Fig. 206 note the number of railways that connect the two countries.

How the different parts of Canada are held together. — The populated portion of Canada is a narrow strip of territory some three thousand miles long, which falls naturally into several divisions, as stated on p. 177. Even Quebec and Ontario are unlike in very important respects. The former, for example, is chiefly Catholic in religion and French is widely spoken, while Ontario is Protestant and English-speaking. How are districts so unlike one another held together?

One means is the excellent government, and the close relation of the entire Dominion to Great Britain, the mother country. The provinces are united much as our states are, the union being called the Dominion of Canada, with its capital at Ottawa. What advantages for this purpose do you see in the location of Ottawa? The satisfactory administration of the government has been one reason why so many people from other countries have migrated to Canada in recent years. The Prime Minister, who in many ways corresponds to our President, remains in power only so long as his government is approved by the people. A Governor-General, however, is appointed by the King of England. Thus Canada is a part of the British Em-

Character of the government

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Fig. 207. — King Street, Toronto

In Fig. 32 note the importance of Toronto as a railway center; note also, on the table on p. 175, its population. What signs, if any, would you expect to see in Toronto of that city's connection with the British Empire?

pire. The pride that Canadians feel in this relation to England was well shown by the remarkable way in which they responded to the call of the mother country in the World War. Another bond between the two countries is a commercial one. Britain greatly needs the lumber, wheat, and other foodstuffs from Canada, while Canada needs English manufactures and English capital for the development of her new industries. To favor this trade, the tariff on goods imported from England is much less than that on similar goods imported from the United States. About half of all Canadian exports go to Great Britain, and one eighth of all her imports come from there, in spite of the great distance of the two countries from each other.

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Fig. 208. — A grain elevator at Fort William, Ontario

Locate Fort William on Fig. 206. What other port is near by? Where does the grain come from? Ocean vessels may load wheat at this elevator and carry the grain to Liverpool. Trace out the route on the map.

The other great aid toward unity is the transportation routes. One of these is the water route from Fort William to the ocean. Name and locate several large cities upon it. The fact that fine passenger steamers as well as freight vessels are used upon it greatly increases its influence in keeping the people of the provinces in touch and sympathy with one another.

Excellence of transportation routes

The chief means of communication, however, are the railways, two of which extend across the continent, a surprising fact in view of the population of only a little more than 8,000,000. Canada has more miles of railway for each thousand of its inhabitants than any other country in the world. That suggests the unusual energy and intelligence of its people. These railroads are now owned by the Canadian Government, though they are commonly referred to by their former names. The government now controls 23,000 miles of railroad, 56,000 miles of telegraph lines, and a fleet of more than sixty steamships which not only operate on Canadian inland waters but cross the Atlantic and the Pacific. The Canadian Pacific Railway system is the most important, connecting St. John in New Brunswick with Vancouver in British Columbia, and having many branch lines. Name the leading cities on this line from Winnipeg westward. Trace the routes of the Grand Trunk Pacific and the Canadian Northern Railway. The Hudson Bay Railway is under construction from the grain region to Port Nelson on Hudson Bay. It will shorten the distance to the Atlantic for the four western provinces by more than 500 miles. Mark out the route. The difficulty is that it can be used only two or three months of each year. Can you explain why?

Possible growth of Canada in the future. — Canada's population according to the census of 1901 was 5,371,000. The figures at the beginning of this chapter, some of which are based on recent counts and others upon even more recent estimates, show a total of

more than 8,000,000 at the present time. How much larger a population can Canada support?

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Fig. 209. — A portion of the railway yards at Winnipeg

Locate Winnipeg. It is one of the greatest railway centers of Canada. Do you see any similarity in its position to that of Chicago that accounts for its importance in this respect?

Future uses of the forest area

1. For lumbering

Probably little of the forest area will be denuded to permit agriculture (p. 176). Yet the forests themselves will bring great wealth. They stretch all the way from the Atlantic to the Pacific (Fig. 14), sweeping far north around the Prairie Provinces and averaging 200 to 300 miles in width. What is the prevailing type of tree? This timber has only begun to be used; and as the supply decreases in the United States and elsewhere, its value for lumber and pulp wood for paper will be high. Care must be taken, however, in the use of these forests to conserve the timber, for great stretches have been destroyed by fire; owing to the slow growth of forest trees caused by the shortness of the summers, it will take many years for a new growth of timber to replace this, or to attain a sufficient size for profitable lumbering.

This area will also be a great fishing and hunting ground; for fish abound in the thousands of lakes left by the Ice Sheet, and there is no other part of America save Alaska where large game is so abundant. Among the animals found here are deer, moose, bear, fox, wolf, wildcat, beaver, and mink. Furs will continue to be one of the important products, as they always have been. Fur farms are now being established in some districts and there is room for thousands of such farms in the region of thin soils.

2. For fishing and trapping

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Fig. 210. — A Hudson's Bay Company's trading post on the shore of Ungava Bay

Locate this bay on Fig. 206. Lonely trading posts like this are found widely scattered over the thinly settled portions of Canada. Can you find some on the map? To these the Indians bring their furs every spring and summer and take in exchange money and goods. The Hudson's Bay Fur Company established its first posts on the shores of Hudson Bay about 250 years ago.

Fig. 202 shows not only how rich southern Canada is in mineral products, but how little of the country

Possible increase in mining

has been explored for minerals. It is probable that many other deposits will be discovered both in the southern section and in the far North; and in this task, the Ice Sheet that did so much harm to agriculture will be a positive benefit. By removing the surface soil and rock it has made it easier both to find and to work the valuable minerals that lie underneath.

Agriculture promises to increase rapidly. Fig. 205 shows the area now devoted to wheat; but the more hardy grains, like oats and barley, and some vegetables can be raised still farther north. Little more than one tenth of the arable land in Canada has thus far been cultivated. The grazing industry is likely to be greatly expanded, and in the far North — north of the region of trees — hundreds of thousands of reindeer may find food, as many do to-day in Alaska (p. 172). Indeed, steps have already been taken to herd all the reindeer of the North into one district and to breed them for food purposes.

Possible increase in agriculture, grazing, and manufacturing

With increase of lumbering, mining, and agriculture, factories will naturally multiply, and thus the population will grow. One prominent authority expects not less than 80,000,000 inhabitants by the end of this century. How does this compare with the present population of the United States?

2. Newfoundland

	Area in Square Miles	Population	Largest City	Population
Newfoundland	42,700	255,000	St. Johns	34,000
Labrador	120,000	4,000		

How the location of Newfoundland has influenced its development. — Newfoundland, with the Labrador coast, which is under its control, is a part of the British Empire; but instead of joining the Dominion of Canada it has remained a separate colony.

Its isolation from the rest of British North America

There has been talk about its uniting with Canada; but its location prevents rail connection with that country and it is even a long distance by boat from St. Johns to any of the Canadian cities (Fig. 206). Estimate the number of miles to Halifax; to Quebec.

Its location has also greatly influenced its industries and its choice of countries for trade. Fishing is by far its most important occupation, more than one fourth of the entire population being engaged in it. The reason for its prominence is found in the nearness of the island to noted fishing grounds. Many varieties of salt-water fish live chiefly in the shallow waters of the ocean rather than in the deep parts. Along the coasts of Newfoundland and Labrador is a vast stretch of water only a few hundred feet in depth (Fig. 1), where cod, herring, and lobsters abound. Moss and other food for the fish are brought here by the icebergs from Greenland, that melt where they meet the warm current that sweeps by this coast (p. 243). These are the noted *Grand Banks*, which attracted fishermen from Europe hundreds of years ago and which are still among the best fishing grounds in the world. The only other prominent industry is the manufacture of wood pulp and paper.

The value of its fisheries

Its easy communication with Europe

Since Newfoundland is nearer to Great Britain than any other part of North America, it sends a large proportion of its products there. It is also interesting to note that its trade with the United States exceeds that with Canada.

Its location makes it very important in one other respect. Being the part of the continent that extends farthest east, it is the best place for the cable and wireless stations that secure communication with Europe.

In view of these facts, it is clear why nearly all the population is found along the southeastern coast. Note how many of the towns are there. Much of the interior is almost uninhabited.

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Fig. 211. — A small tramp steamer in one of the fiords of Labrador

Labrador has little to export. Can you tell why? This steamer is taking on a load of whalebone, an accumulation of many years. These will be carried to Europe to be ground up for fertilizer. How many settlements does your map show along the coast of Labrador?

Facts to be especially well fixed. — 1. The temperature regions of Canada. 2. How the west coast differs from the interior in temperature and rainfall. 3. The four divisions of Canada and the character of each. 4. Location of Montreal; Quebec; Ottawa; Halifax; Toronto; Winnipeg; Calgary; Vancouver; Victoria. 5. Names and locations of the principal provinces. 6. The chief products of Ontario and Quebec. 7. Of the Prairie Provinces. 8. Of the Maritime Provinces. 9. Of British Columbia. 10. Of Newfoundland.

Problems for independent study. — 1. Make a drawing of the Great Lakes and St. Lawrence waterway and show the location of the canals. Locate the principal cities upon this waterway. 2. Why should not Canada have saved the enormous expense of building transcontinental railroads by merely running short lines southward to connect with our transcontinental roads? Scribner's, vol. 57, pp. 591–610. 3. Write an essay on the subject: Reasons for close friendship between Canada and the United States. Adams, C. C.: *A Textbook of Commercial Geography*, pp. 192, 193 (Appleton); Independent, 1915, vol. 84, p. 57; Century, 1919, vol. 98, pp. 701–706. 4. Canadians hope to enlarge the canals in their great waterway so as to permit much larger vessels to reach Fort William. Do you see any effect this might have on Montreal? 5. Compare the area of the different provinces of Canada with that of Texas. 6. What parts of Canada are popular as summer resorts? Why? Look up advertisements of railroad and steamship companies in newspapers or magazines, and get special advertising booklets if you can. 7. What is a "factory" in the cold region of Canada? Who is the "factor"? Write a letter from such a "factory" that you are visiting, describing the life of the factor to a friend in your school. 8. Debate the question: *Resolved*, that Newfoundland should become one of the provinces of the Dominion of Canada. 9. Find the reason for the many fogs off the coast of Newfoundland and the dangers they cause to fishermen and ships. Allen, N. B.: *Geographical and Industrial Studies: United States*, pp. 290, 291 (Ginn); Carpenter, F. G.: *North America*, pp. 315, 316 (American Book); Fairford, F.: *Peeps at Many Lands: Newfoundland*, pp. 13–18, 51–59 (Macmillan). 10. Can you explain the natural reason for the boundary between Labrador and Canada? (See Fig. 206.)

VII. Countries South of the United States

Country, Island, or Archipelago	Form of Government	Area in Square Miles	Population	Largest City	Population
Mexico	Republic	767,200	15,116,000	Mexico City	1,080,000
The West Indies:					
Bahama Islands	British colony	4,400	60,000	Nassau	14,000
Cuba	Republic	44,200	2,899,000	Havana	361,000
Dominican Republic	Republic	19,300	955,000	Santo Domingo	27,000
Haiti	Republic	10,200	2,500,000	Port au Prince	120,000
Jamaica	British colony	4,400	891,000	Kingston	57,000
Lesser Antilles	Possessions of European nations	5,600	1,343,000	Port of Spain	68,000
Porto Rico	Dependency of U. S.	3,600	1,300,000	San Juan	72,000
Virgin Islands of the U. S.	Dependency of U. S.	130	26,000	St. Thomas	8,000
Central America:					
British Honduras	British colony	8,600	42,000	Belize	10,000
Costa Rica	Republic	23,000	459,000	San José	52,000
Guatemala	Republic	48,300	2,004,000	Guatemala	90,000
Honduras	Republic	44,300	606,000	Tegucigalpa	29,000
Nicaragua	Republic	49,200	746,000	Leon	74,000
Panama	Republic	32,400	337,000	Panama	61,000
Panama Canal Zone	Government possession of U. S.	500	23,000		
Salvador	Republic	13,200	1,299,000	San Salvador	66,000

1. Mexico

Questions. — 1. Compare Mexico with Texas in density of population. 2. Cuba is about the size of which one of our states? 3. Compare Porto Rico with Connecticut in area and population. 4. What appears to be the form of government of most of the Central American countries? 5. The population of the Canal Zone has greatly diminished. Find out why.

The most attractive part of Mexico.—In most countries the largest numbers of people congregate in the lowlands near the ocean. Most large cities have such a location. Give several examples. Yet that is not where they are found in Mexico. Fig. 10 shows little population on either coast. Nor are there many inhabitants in the broad northern part of the country. For hundreds of years the densest population has been in the neighborhood of Mexico City, which is some two hundred miles from either ocean. This is by far the largest city in Mexico. Note its population. Several of the other leading cities are not far distant from it. Name some of them.

Principal advantages of this section. — The principal advantage of this central section is its equable climate. **The temperature** Trace the Tropic of Cancer across Mexico. Note that it is midway between the most northern and the most southern point in the country. This fact is significant. But since lines showing latitude take no account of altitude, they may give a false impression regarding climate. In Fig. 12 one can see the temperature regions in which Mexico lies. Along each coast there is a strip of lowland from ten to one hundred miles wide in the region that is *always hot*. Yucatan also is low, level land and very warm.

The interior of Mexico, on the other hand, is a vast plateau. In the north, near the United States boundary, this plateau averages about

5,000 feet above sea level; but toward the south it rises until a little south of Mexico City it is about 8,000 feet. The altitude of Mexico City itself is about 7,400 feet, and many of the other cities are over 6,000 feet above the sea. This region, as Fig. 12 shows, is in the area that is *always mild*. Do you wonder, then, that the Mexicans prefer the plateau to the hot lowland?

On the eastern and western margins of the plateau and nearly parallel with the coast are mountain ranges that come together just south of Mexico City in very lofty peaks. Popocatepetl, within easy view of Mexico City, is 17,888 feet in height, and Mt. Orizaba, the highest of all, is 18,701 feet. Fig. 215 shows how extensive is the area that is at least 5,000 feet in altitude. Among the mountains it is of course cool, and the snow never fully disappears from the higher peaks, even though they are in the tropics.

The rainfall

Fig. 13 shows that the rainfall on the plateau in the extreme north is very light, like that in the United States across the border. But toward the south it increases so that much of the southern half of the country has at least thirty inches, or enough for ordinary agriculture; and in some places where rain is lacking water for irrigation can be obtained from the mountains, though much less is available than in the United States. Here, then, is another explanation of the denser population of this region.

Some of the lowland along the eastern coast has a moderate to heavy rainfall and, being hot, has a wet, tropical climate. The rainfall of Yucatan, however, is barely sufficient for agriculture, and the variety of crops is limited. The distribution of rain in Mexico is easily understood if one considers the position of the country with respect to the belts of winds. The southern part of Mexico is in the belt of the northeast trades, which give rain only when they rise over highlands. Yucatan is therefore dry, while the east slope of the highlands is moist. Northern Mexico is in the horse latitude belt of calms (p. 233) most of the year and on this account gets little rain; but in the summer the equatorial rain belt shifts northward and covers much of Mexico. The rainy season is therefore in the summer, and of brief duration in the northern section. The rain on the southwestern coast comes from winds that blow landward from the Pacific.

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Fig. 212. — A fruit market at Cordoba, Mexico

Cordoba is on the inner edge of the coastal lowland bordering the Gulf of Mexico. The fruit for sale is the product of a tropical region. What kinds do you see?

Products that Mexico might supply. — Variety of climate means variety in native

plants and agricultural products. This advantage Mexico enjoys to an unusual degree. In traveling from one coast to the other, one experiences greater changes of temperature than in crossing our entire country from north to south. Our principal grains; the crops characteristic of our Southern States; semi-tropical fruits; many tropical fruits and trees, — all these flourish in Mexico.

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Fig. 213. — A view over a part of Mexico City

The buildings are, as you might expect, Spanish in character.

Great quantities of food could easily be produced. Mexico has about one fourth of the area of the United States, and large sections are very fertile. Mexico could easily raise enough agricultural products not only to supply her own needs but also to export large amounts to other countries.

In addition to its agricultural possibilities, the Mexican plateau is one of the greatest mineral regions in the world.

Difficulties in the way of production. — With such natural advantages, what are the difficulties in the way of extensive production?

One difficulty is the lack of education. Less than twenty per cent of the people are white. These whites speak Spanish, and many of them are highly educated. Some of the others, also, are well educated, especially in the cities. Mexico City shows many evidences of modern ideas, such, for example, as fine houses and public buildings, good pavements, modern lighting, adequate water systems, and electric railways. Most of the natives, however, are ignorant Indians or people of mixed blood. Spanish is the language of the educated, but among the uneducated more than fifty dialects are used. Thus the masses are divided into groups that cannot easily communicate with one another.

Lack of education

Moreover, less than fifty per cent of the adults are able to read. They are ignorant of many of the simplest facts about how to live and how to work. For instance, the houses have frequently only one room, in which the family cooks, eats, and sleeps. The food is of the crudest sort; men and women go barefoot a great deal; and one can still see the wooden plow, which only scrapes the ground, and the two-wheeled cart with solid wooden wheels, drawn by oxen.

Few of the mines are worked by modern machinery. In many of them the ore is raised from the shafts in rawhide buckets with a windlass worked by a mule, and the metal is separated from the ore by an old-fashioned process. The foreigners, of course, who have

investments there and the educated Mexicans of Spanish descent work in a very different fashion; but the others make up the larger part of the population. Under such circumstances farms and mines produce only a small fraction of what they ought to produce.

A second difficulty is the unstable government. Mexico is a republic, modeled after our own, having about thirty political divisions corresponding to our states and territories, with Mexico City as the capital. But there is frequently disorder and civil war has been common. Fields have lain idle, towns have been burned, and factories have been destroyed or abandoned, while bands of armed men have gone up and down the country, living upon what they could take from the people. The government has not been strong enough at times to preserve order.

Weakness of the government

Certain arrangements in regard to land and labor have had a further bad effect upon production.

In our own country the public lands have been given to settlers in small amounts, usually 160 acres, or a quarter of a square mile. The owner has made such a farm his home, and because he owned it and might eventually buy more land, he has worked harder than he would otherwise have done and has been interested in good government, good schools, and public improvements.

Poor laws regarding land and labor

In Mexico a different plan has been followed. In the days when Spain controlled the land, enormous areas were granted to Spanish subjects for money or as a reward for public services. In north central Mexico is one of the largest of these estates, called the Hacienda Cedros (Fig. 216).

Labor laws have worked hardships for the poor man; for they have compelled one who was in debt to work for his creditor until the debt was paid. The wage received is usually low; and there is little hope of improving one's condition, even after one gets out of debt. So the debtor spends his life in servitude, more or less hopeless or shiftless; and his children grow up in ignorance, to follow in his ways. Such people are called *peons* — a peon being a man bound out to work for his creditor; much of the labor in Mexico is performed under this *peonage* system.

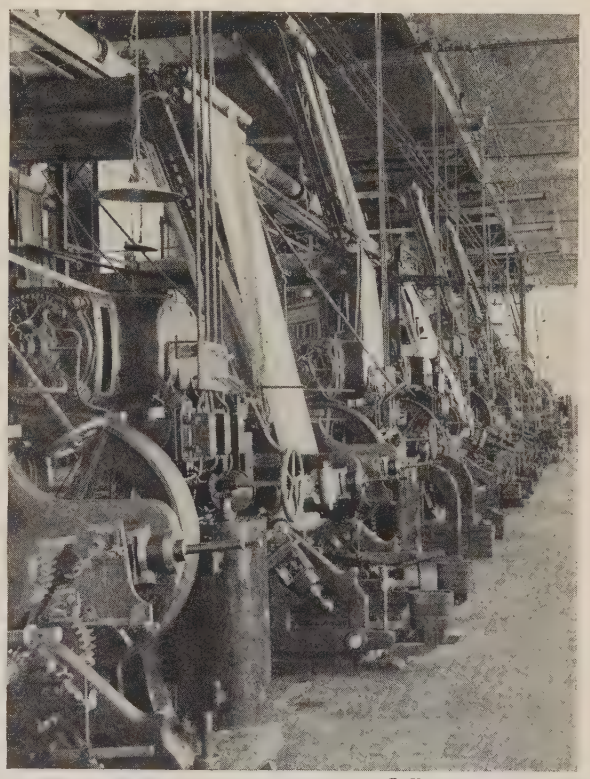

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Fig. 214. — Printing room in a cotton mill at Orizaba, Mexico

Before the late wars in Mexico nearly 150 cotton mills were in operation. Some of the more modern mills were at Orizaba, Mexico City, and Pueblo. One mill at Pueblo employed 2,000 workers. Why is cotton worn more than woolen in Mexico?

Lack of easy means of transportation is a fourth serious obstacle to production. Mexico has only about 16,000 miles of rail-

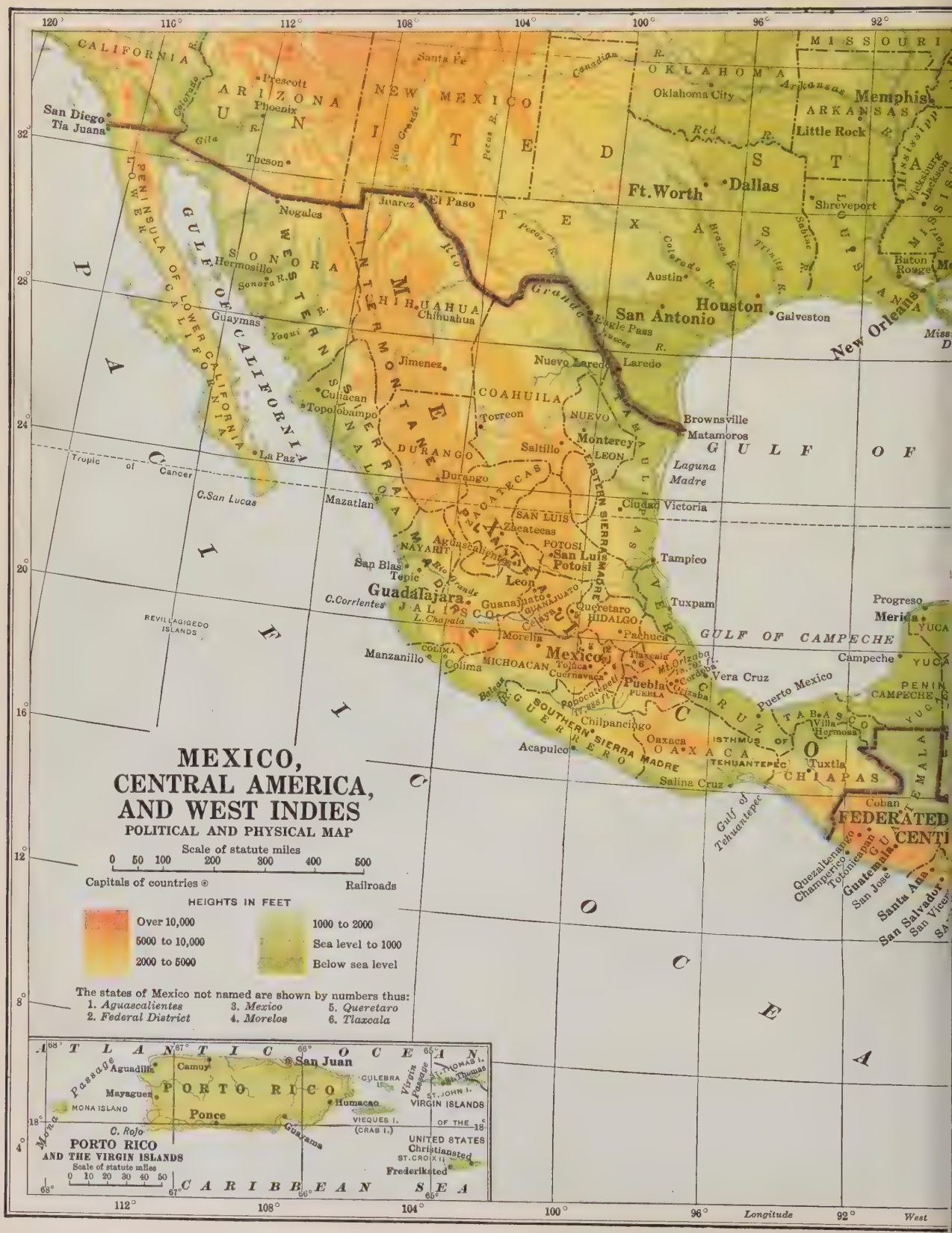
MEXICO, CENTRAL AMERICA, AND WEST INDIES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300 400 500
Capitals of countries ⊙
Railroads
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
Sea level to 1000
Below sea level
The states of Mexico not named are shown by numbers thus:
1. Aguascalientes
2. Federal District
3. Mexico
4. Morelos
5. Queretaro
6. Tlaxcala
PORTO RICO AND THE VIRGIN ISLANDS
Scale of statute miles
0 10 20 30 40 50
CALIFORNIA
ARIZONA
NEW MEXICO
TEXAS
OKLAHOMA
ARKANSAS
MISSOURI
LOUISIANA
MISSISSIPPI
TENNESSEE
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
KENTUCKY
WEST VIRGINIA
Santa Fe
Prescott
Phoenix
Tucson
San Diego
Tia Juana
Nogales
Juarez
El Paso
Oklahoma City
Little Rock
Memphis
Ft. Worth
Dallas
Shreveport
Austin
Houston
Galveston
San Antonio
Eagle Pass
Laredo
Nuevo Laredo
Brownsville
Matamoros
New Orleans
Baton Rouge
Hermosillo
Guaymas
Chihuahua
Jimenez
Torreon
Culiacan
Topolobampo
La Paz
Mazatlan
Durango
Saltillo
Monterey
Victoria
Tampico
Zacatecas
San Luis Potosi
Aguascalientes
Tepic
Guadalajara
Leon
Guanajuato
Queretaro
Morelia
Pachuca
Mexico
Toluca
Cuernavaca
Puebla
Tlaxcala
Orizaba
Vera Cruz
Tuxpam
Puerto Mexico
Progreso
Merida
Campeche
Manzanillo
Colima
Acapulco
Chilpancingo
Oaxaca
Tehuantepec
Salina Cruz
Tuxtla
Coban
Guatemala
San Jose
Santa Ana
San Salvador
Quezaltenango
Champerico
Totonicapan
Gulf of California
Lower California
Peninsula of Lower California
Gulf of California
Pacific Ocean
Gulf of Mexico
Gulf of Campeche
Caribbean Sea
Tropic of Cancer
C. San Lucas
C. Corrientes
Revillagigedo Islands
Isthmus of Tehuantepec
Sierra Madre Occidental
Sierra Madre Oriental
Sierra Madre del Sur
Rio Grande
Rio Colorado
Pecos R.
Canadian R.
Red R.
Arkansas R.
Brazos R.
Trinity R.
Sabine R.
Yaqui R.
Gila R.
Mississippi R.
Laguna Madre
Popocatepetl
Ixtaccihuatl
Orizaba
Longitude
West
Passage
Aguadilla
Camuy
San Juan
Mayaguez
Humacao
Ponce
Guayama
C. Rojo
Mona Island
Culebra
Vieques I.
(Crab I.)
St. Thomas I.
St. John I.
Virgin Islands of the United States
Christiansted
St. Croix I.
Frederiksted
Mona Passage
Virgin Passage

Fig. 215

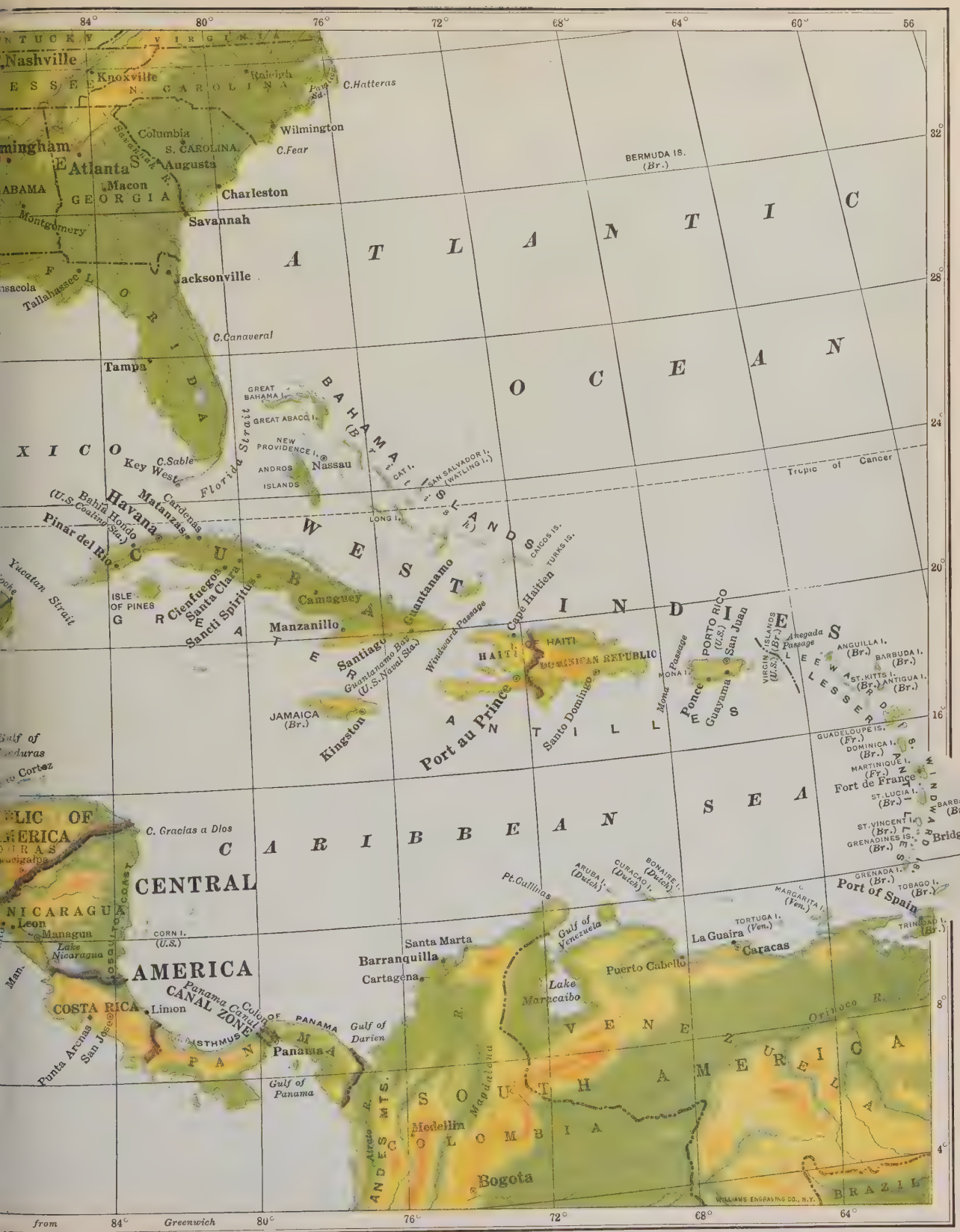
84°
80°
76°
72°
68°
64°
60°
56
32°
28°
24°
20°
16°
12°
8°
4°
Nashville
Knoxville
Raleigh
C. Hatteras
Wilmington
Columbia
S. CAROLINA
C. Fear
Atlanta
Augusta
Macon
GEORGIA
Charleston
Savannah
Montgomery
Jacksonville
Tallahassee
Pensacola
C. Canaveral
Tampa
BERMUDA IS. (Br.)
ATLANTIC OCEAN
GREAT BAHAMA I.
GREAT ABACO I.
NEW PROVIDENCE I.
ANDROS ISLANDS
Nassau
CAT I.
SAN SALVADOR I. (WATLING I.)
BAHAMA ISLANDS
Florida Strait
Key West
C. Sable
Tropic of Cancer
Havana
Matanzas
Cardenas
Bahia Honda (U.S. Coaling Sta.)
Pinar del Rio
LONG I.
CAICOS IS.
TURKS IS.
Yucatan Strait
ISLE OF PINES
Cienfuegos
Santa Clara
Sancti Spiritus
Camaguey
Guantanamo
Manzanillo
Santiago
Guantanamo Bay (U.S. Naval Sta.)
Windward Passage
Cape Haitien
HAITI
DOMINICAN REPUBLIC
Mona Passage
PORTO RICO (U.S.)
San Juan
Ponce
Guayama
VIRGIN ISLANDS (U.S.) (Br.)
Anegada Passage
ANGUILLA I. (Br.)
BARBUDA I. (Br.)
ST. KITTS I. (Br.)
ANTIGUA I. (Br.)
LESSER ANTILLES
GUADELOUPE IS. (Fr.)
DOMINICA I. (Br.)
MARTINIQUE I. (Fr.)
Fort de France
ST. LUCIA I. (Br.)
ST. VINCENT I. (Br.)
GRENADINES IS. (Br.)
BARBADOS I. (Br.)
Bridgetown
WINDWARD ISLANDS
GRENADA I. (Br.)
Port of Spain
TOBAGO I. (Br.)
TRINIDAD I. (Br.)
MARGARITA I. (Ven.)
TORTUGA I. (Ven.)
La Guaira
Caracas
Puerto Cabello
Lake Maracaibo
Gulf of Venezuela
Pt. Gallinas
ARUBA I. (Dutch)
CURAÇAO I. (Dutch)
BONAIRE I. (Dutch)
Port au Prince
Kingston
JAMAICA (Br.)
Santo Domingo
Gulf of Honduras
Cortez
C. Gracias a Dios
CARIBBEAN SEA
CENTRAL AMERICA
NICARAGUA
Managua
Leon
Lake Nicaragua
MOSQUITO COAST
CORN I. (U.S.)
COSTA RICA
Limon
Punta Arenas
San Jose
CANAL ZONE
Panama Canal
COLOMBIA
ISTHMUS OF PANAMA
Panama
Gulf of Panama
Gulf of Darien
Santa Marta
Barranquilla
Cartagena
Medellin
Bogota
Magdalena R.
Orinoco R.
VENEZUELA
SOUTH AMERICA
ANDES MTS.
BRAZIL
WILLIAMS ENGRAVING CO., N.Y.
from Greenwich

Fig. 215

Questions on Fig. 215. — 1. Contrast the railroad mileage in the United States with that in the countries south of it. Explain the difference, and show its probable effects on the industries of these countries. 2. In what direction do vessels go in passing through the Panama Canal from the Atlantic to the Pacific (see also Fig. 227)? 3. Point out the island on which Columbus is thought to have made his first landing in America. 4. Show that in the West Indies or in Central America south of the Isthmus of Tehuantepec one is rarely more than 100 miles from the sea.

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way, which is about one fourth of our average for the same area. This leaves many points, even in the best part of the country, from fifty to a hundred or more miles from the nearest railroad. Fig. 215 shows the railways, and you can test these distances by using the scale on the map. Locate the Tehuantepec Railway. What reason do you see for its special importance in the past?

Lack of transportation facilities

Mexico has no such system of waterways for transportation of goods as has the United States. Most of the rivers are short, for they flow down the steep slopes of the plateau to the sea on the east and west. They are so swift and have so many rapids and falls that they are generally useless for navigation.

Most of the harbors, also, are poor. The two principal ports on the eastern coast are Vera Cruz and Tampico, both of which depend upon breakwaters for the protection of vessels. The best harbor is Acapulco, on the western coast; but it has rugged land to the east, and little commerce. Find each of these on the map.

Wagon roads are as important for prosperity as railroads. It is an enormous task to build good roads in any "new" country. In Mexico, where much of the surface is rough and mountainous, little work on road building has ever been done outside the cities. In consequence, people in the country depend largely on trails; and donkeys and pack horses take the place of wagons. The small sure-footed burro is seen everywhere, although he is slow and carries only light burdens. In the time of the Aztec Indians it is said that swift-running men in relays delivered fish from Vera Cruz to Mexico City, 260 miles distant, within twenty-four hours after the fish had left the water. What rate of travel would that be? Indian runners are still used for carrying messages and merchandise long distances.

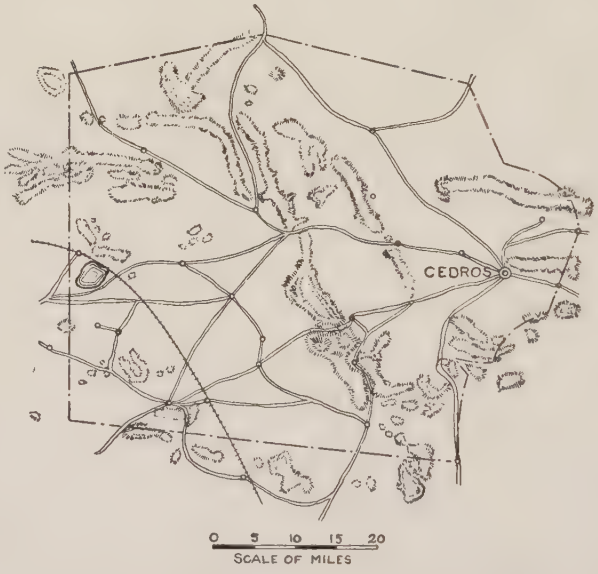


Fig. 216. — Large estate, *Hacienda Cedros*

By use of the scale estimate the dimensions and area of this estate. The principal village consists of the Manor House where Cedros, the first owner, lived; a church; an ore mill and smelter; corrals for cattle; and adobe huts for the workmen. The Manor House has adobe walls four feet thick, and is built around a court sixty or seventy feet square. The rooms have tiled floors and huge hewn beams in the ceilings. The irrigated garden adjacent to the house includes forty acres and is enclosed by a wall ten feet high.

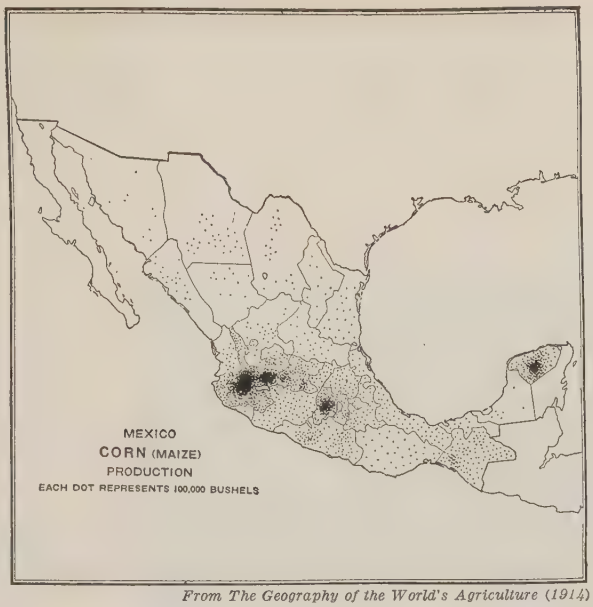
When means of transportation are so poor, many sections cannot obtain the tools and raw materials needed for the simplest industries; nor can they market their farm and mining products easily. Thus both trade and

manufacturing are carried on at a disadvantage.

The leading industry is agriculture, yet only about one fifteenth of the total area is under cultivation. On the southern portion of the plateau, where the rainfall is sufficient for agriculture or water for irrigation can be obtained from the mountains, wheat, barley, corn, and beans are raised. Corn (Fig. 217) and beans are the commonest foods of the inhabitants. Fruits, such as apples, pears, peaches, and grapes, are also grown.

Importance of agriculture and grazing

1. On the plateau



From The Geography of the World's Agriculture (1914)

Fig. 217

Long before Europeans reached North America corn was grown for food by the Indians of Mexico. Corn to-day is the leading crop in Mexico. Why is it so little grown in the northern portions of the country?

Two species of plants in the arid sections are of special importance. One is the *agave*, a kind of century plant, whose juice is made into *pulque*, the national alcoholic drink of the working class, and into another beverage called *mescal*. The other is the *guayule*, a scrub plant reaching a height of three or four feet and valuable for rubber. It is especially important because it is a rubber plant that thrives in a region where white men can live.

Most of the vast arid section of northern Mexico is given up to grazing, like the land in some of our states across the border. In this region Americans are especially active, owning some very large estates.

Corn and beans are common on the slopes and hot lowlands, as on the plateau. Other important lowland products are cotton, sugar, coffee, indigo, cocoa, rice, potatoes, and rubber; also a great variety of fruits, such, for example, as the banana, pineapple, orange, and lemon. Foreigners are developing sugar, coffee, and rubber plantations extensively on the tropical lowlands. In Yucatan, henequin, or *sisal*, from which binding twine is made, is the great crop. This plant is a kind of agave, somewhat like that raised on the plateau. Grazing is important in Yucatan. Why is agriculture limited in that section?

2. On the slopes of the plateau and on the lowlands

There are about 2,300 mining properties in Mexico, about five sixths of which are silver mines. For 400 years the plateau has been the greatest silver-producing region in the world; and it still supplies about one fifth of the world's output of that metal. The gold output is about one half as important. A great iron mountain near Durango, which is said to contain 300,000,000 tons of excellent iron ore, is now being mined extensively under the control of Americans. These mines are connected by rail with the railways of the United States.

Importance of mining

The only mineral of importance in the lowlands is oil. The principal oil district is that about Tampico, where about 5,000,000 acres of land are held for oil purposes.

How does this compare with the area of Connecticut? The oil industry is a very recent development. In 1900 only 1,000,000 barrels were produced, while in 1919 the production was over 80,000,000 barrels. One well near Tuxpam, undoubtedly the largest in the world, has produced as much as 160,000 barrels in a day. There are more than 300 productive wells in Mexico, most of which are under the control of the English and Americans. During the World War the Tampico fields were the main source of supply for the British war vessels. Several tank steamers leave Tampico every day.

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Fig. 218. — Sisal hemp on the wharf at Progreso, Mexico

Locate Progreso. Where does this hemp come from? To what port in the United States will it probably go?

Minerals make up much more than one half the exports — silver, gold, copper, and oil being most prominent. Not many products of the soil are exported; among the most important are sisal, hides, and vegetables. The fact is that owing to the difficulties in the way of production the vast majority of the people are not producing enough materials for food, shelter, and clothing to enable them to live comfortably themselves, to say nothing of exporting surplus products to other countries.

Exports

Why the United States is anxious for improvement in Mexico. — Since the United States is so close at hand, it is naturally the principal country with which Mexico trades. In fact, in 1918 her trade with the United States was twelve times as great as that with all other countries combined. Though we thus practically monopolize trade with Mexico, the actual amount ought to be far greater. We should like more of her metals, her cattle and hides, coffee and rubber. We are especially anxious to get her binding twine, for our farmers suffer seriously when there is a shortage of hemp. In return, since we manufacture so extensively and Mexico so little, we can well send her machinery, cotton goods, and furniture. Both nations would be more prosperous if such exchange were increased; but it cannot take place until the conditions in Mexico are improved. From what ports in Mexico could some of the products be shipped? What railroad routes might well be followed? What ports in the United States would be likely to be used in shipping goods by water to Mexico?

Need of more trade between the two countries

During recent years bands and even small armies of outlaws have crossed our border and destroyed our property and even killed our citizens. In one

Protection of our citizens

raid the town of Columbus in New Mexico was partly burned and many of its inhabitants murdered. The boundary line is over 1,700 miles long and the country on the south side is an arid waste, so that roving bands, bent on raids, can approach close to the border without being discovered. Note the number of towns on our side that are thus exposed to attack. Name and locate several. There are also many villages and ranches within easy reach of the border.

As already stated, our citizens own valuable properties in Mexico, such for example as mines, ranches, and plantations; these Americans have suffered seriously during the recent disturbances in Mexico. Indeed, the lives of many foreigners have been endangered and often sacrificed. It is extremely difficult to protect ourselves against such dangers unless we abandon all commercial intercourse with that country.

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Fig. 219. — A rope and twine factory in Yucatan

In the foreground are seen coils of sisal fiber to be twisted into rope and twine. Much of the sisal of Yucatan is exported in an unfinished condition to factories in the United States.

Above all we want the friendship of Mexico, because close neighbors should be especially good friends. Yet misunderstandings and suspicions easily arise when a great portion of a people can neither read nor reason intelligently, and when their wants are so poorly supplied that they are discontented.

Desire for closer friendship

Facts to be especially well fixed. — 1. Where the Tropic of Cancer crosses Mexico. 2. The name and location of the principal city and of the three main ports. 3. The location of the highlands and lowlands. 4. The distribution of rainfall. 5. The location of the temperature belts. 6. Agricultural products. 7. Mineral products.

Problems for independent study. — 1. Would you expect clothing and shelter to be more or less expensive in Mexico than where you live? Why? Adams, C. C.: *A Textbook of Commercial Geography*, pp. 331–334 (Appleton); Trowbridge, E. D.: *Mexico*, pp. 109–114, 166–178 (Macmillan). 2. The coal mined in Mexico is about one seven-hundredth that mined in the United States and but little is imported. What does that fact tell you about the development of the country? Carpenter, F. G.: *North America*, pp. 334–343 (American Book). Write to the Pan-American Union, Washington, D. C., for the pamphlets, *Mexico, a Review and a Forecast*, and *Mexico, General Descriptive Data.* National Geographic Magazine, 1919, vol. 36, pp. 307–330; 1920, vol. 37, pp. 181–202; February, 1920, vol. 38; Trowbridge, E. D.: *Mexico*, pp. 217–221, 273–282. 3. Why is it generally inadvisable to farm fifty or a hundred miles from a railroad? 4. There has been some talk about a canal across the Isthmus of Tehuantepec. What advantages do you see in that location over the Panama Canal? What disadvantages? Blichfeldt, E. H.: *A Mexican Journey*, Chapter VI (Crowell); Winter, N. O.: *Mexico and Her People of To-day*, Chapter

VII (L. C. Page); Carson, W. E.: *Mexico*, pp. 378–380 (Macmillan). 5. Acapulco has, perhaps, the finest harbor on the western coast of North America south of San Francisco. What is its prospect of becoming a great port? Blichfeldt, E. H.: *A Mexican Journey;* Winter, N. O.: *Mexico and Her People of To-day.* 6. How does its prospect compare with that of Vera Cruz, whose harbor is poor? Why? Adams, C. C.: *A Textbook of Commercial Geography*, pp. 329–331 (Appleton). 7. How many railroads lead from Mexico into the United States? Can one go from New York to Mexico City by rail? National Geographic Magazine, 1919, vol. 36, pp. 307–330. 8. Watch for printed articles and talk with well-informed persons about improvements in governmental affairs in Mexico. 9. Draw an outline map of Mexico from memory. 10. Would it be advisable for us to make Mexico a part of the United States, if the Mexicans desired it? Atlantic Monthly, July, 1920, *Where We Stand with Mexico;* World's Work, vol. 38, pp. 572–574.

2. West Indies

Ownership of these islands. — Of the four largest islands, called the Greater Antilles, Cuba is an independent republic; Haiti is divided into two republics, that of Haiti on the west side and the Dominican Republic on the east; Porto Rico is a possession of the United States; and Jamaica is a British colony. The other islands, or Lesser Antilles, are divided among various countries, especially Great Britain, France, and the United States. Look these up on Fig. 215.

Interest of the United States in the West Indies. — While Great Britain owns by far the largest number of islands among the West Indies, including all the Bahamas, the country most interested in this region and most influential here is the United States.

Our military interest

This interest is partly military. We have so long a coast line facing the Gulf of Mexico that it is important for us to control the entrance to the Gulf as fully as possible. Estimate, from the map, the length of this coast. Now that we have built the Panama Canal, it is also necessary for us to be able to protect it from rivals and from possible attack in case of war.

With this aim in mind we have erected fortifications at the entrances of the canal; have purchased the rights to the Nicaragua route, so that the United States is the only nation that can dig a canal there; and have leased two bases in Cuba that give us control of the channels at the east and west of that island. Our ownership of Porto Rico gives us command of the channel just west of it; and our purchase from Denmark in 1917 of some small islands east of Porto Rico, now called the Virgin Islands of the United States, gives us an additional advantage.

The chief city of the Virgin Islands, St. Thomas (Fig. 215), has one of the finest harbors in the world and lies at the point where two great steamship routes cross one another — one from Liverpool to the Panama Canal, and the other from New York to South America (see Fig. 495). It is of value both as a base for our navy and as a coaling station for our merchant vessels. Owing to its favorable location it has been called the keystone of the arch of the West Indies.

Our commercial interest

Our other interest in the West Indies is a commercial one. Our nearness to these islands and our importance among nations cause their inhabitants to look to us for aid when serious difficulties arise in their finances or grave disorders in their government. Still more important, however, is our relation to them as the natural market for their products.

The sameness of climate throughout the islands leads them all to grow similar crops and to import the same kinds of articles

from abroad. Their foreign trade, therefore, must be with distant lands rather than with one another. On the other hand, we are in special need of tropical products, since we cannot grow many of them ourselves. We are also a great manufacturing nation, while they must import many of their manufactured goods. For these reasons and because we are so near, their trade is mainly with us.

Variety and quantity of products from the West Indies. — Excellence of the climate for tropical products The climate is very favorable for agriculture. Most of the islands are mountainous, some of the peaks being 8,000 to 10,000 or more feet in height. In what temperature region are these islands? There is some variety of temperature, according to altitude. Rain is abundant in most sections, but the rainfall is especially heavy on the windward slopes of the mountains, where the moist trade winds are forced to rise (p. 235). In the larger islands these winds are from the northeast; in the Lesser Antilles they blow from the east and southeast. The location of the West Indies places them beyond the reach of the cold north winds that occasionally do so much damage to the subtropical plants in our Southern States.

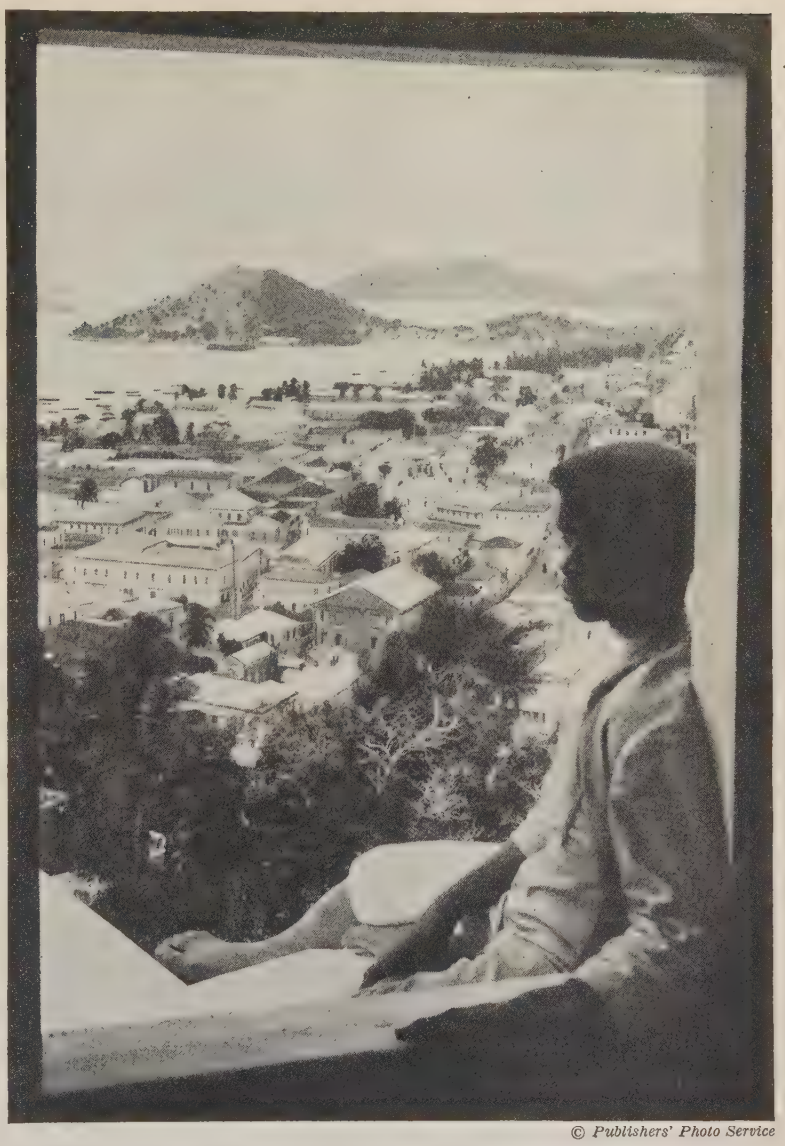

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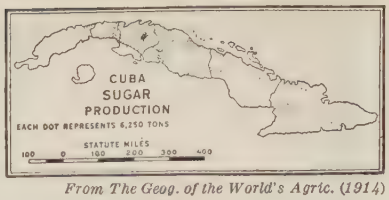
Fig. 220. — The harbor of St. Thomas

Until recently the city of St. Thomas was known as Charlotte Amalie.

Sugar is the leading product, being raised on most of the islands. Cuba in some years leads the world in its production. Yet the area there under cultivation for sugar is only about one tenth of what it could be. If all the land available were used, Quantity of sugar Cuba alone could undoubtedly supply the present world demand for sugar. Even as it is, it produces in some years more than ten times as much cane sugar as the United States. Porto Rico, less than one tenth as large as Cuba, produces considerably

more than do our Southern States. The fact that their freedom from frost makes it unnecessary to plant new cane for each crop is probably the greatest advantage that all these islands enjoy over our country for cane-sugar production (p. 107). Fig. 221 shows the location and amount of sugar production in Cuba. See also Fig. 489.



From The Geog. of the World's Agric. (1914)

Fig. 221

The world's supply of bananas could also be secured from these islands. Bananas are a comparatively new article of food in the United States. Before 1870 few Americans had ever seen a banana; but we now consume about 50,000,000 bunches per year from Central and South America and these islands.

Other agricultural and forest products

While Brazil leads the world in the production of coffee, nearly one third of the world's supply comes from the countries bordering the Caribbean Sea. Haiti raises a larger quantity than any of the other islands, but the best quality comes from Jamaica. The United States is encouraging the production of coffee in Porto Rico.

Some of the best tobacco in the world comes from western Cuba. A considerable portion of this is manufactured into cigars and cigarettes in Havana. Every one has heard of the Havana cigar. Tobacco is one of the most important products of Porto Rico also; a very large number of cigarettes is manufactured there. Many other agricultural products are raised in these islands, such, for example, as pineapples, coconuts, and spices. Fruits and vegetables are grown extensively for our winter market. Different kinds of wood also are abundant, particularly cabinet woods and dyewoods.

The precious metals have been mined, but iron ore and copper much more extensively. Cuba is richest in ores; she is now sending iron ore to steel centers in Pennsylvania and it is expected that shipments will be made to Great Britain in the near future. The most interesting mineral product of the West Indies, however, is *asphalt*. There is an entire lake of it on the island of Trinidad, near the coast of South America. It is cut from this lake in large chunks for shipment abroad, especially to the United States, where it is extensively used for street paving and in the manufacture of paints.

Production of minerals

© *Underwood and Underwood*

Fig. 222. — A tobacco plantation near Havana
Note the banana trees in the background.

While the production of all these commodities can be

greatly increased, this is likely to come about slowly. Every region has its drawbacks, and those hindering production in these islands are numerous. The heat is steady and oppressive, in spite of the moderating influence of the ocean; tropical diseases are always threatening; there are many insect pests; violent storms and hurricanes are frequent; destructive earthquakes are not infrequent; and, worst of all, a majority of the people are densely ignorant. Yet the demand for West Indian products is bound to increase, and progress, even though slow, is therefore assured.

Difficulties in the way of production

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Fig. 223. — Digging asphalt on the island of Trinidad

Locate Trinidad. The asphalt is dug from a lake of asphalt the surface of which is hard enough to support even a light railroad. Beneath the crusted surface is the thick liquid asphalt, which hardens slowly as the hard surface is removed.

Our close relations with these islands. — One fact which encourages close relations between these islands and the United States is the ease with which commerce between the two can be carried on. It is an easy voyage from our eastern ports to Havana, by far the largest city in all the islands; indeed, the trip can be made almost entirely by land, since trains run southward all the way to Key West in Florida (Fig. 215). Estimate the distance from there to Havana. Note how directly south from New York the West Indies lie. Estimate the distance from New York to Kingston in Jamaica; to San Juan in Porto Rico. Most of the harbors of the larger cities are excellent, and in some of the islands within recent years there has been much improvement in

Fig. 224. — A wharf on the water front at Havana

What are the principal exports and imports of Cuba? Most of them pass through Havana.

Fig. 225. — A portion of the city and harbor of San Juan, Porto Rico

the highways and railroads. The United States has brought about a great improvement in the transportation facilities in Porto Rico, and has exerted a good influence in this respect over Cuba; and Jamaica, which supplies us with large quantities of tropical fruit, is well provided with roads and railways.

Facts to be especially well fixed. — 1. The names and location of the four largest islands. 2. Why the United States is especially interested in the Caribbean region. 3. The leading products of the islands. 4. Location of Havana; Santiago; Kingston; San Juan; Ponce; San Domingo; Port au Prince; Port of Spain.

Problems for independent study. — 1. The Caribbean Sea is sometimes called the American Mediterranean. To what extent is this a fitting name? Bonsal, S.: *The American Mediterranean* (Moffat); Trotter, S.: *Geography of Commerce*, pp. 200–203 (Macmillan). 2. Do you think that it would be advisable for a young man or woman from the United States to go to one of these islands to live? Why? National Geographic Magazine, 1920, vol. 38, pp. 1–30; Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 222–234 (Macmillan). 3. The plantation method of farming is in some ways preferable to the method common in the United States by which a farmer cares for a small farm with but little help. Why? 4. The demand for goods from the United States is far less than it would probably be from the same number of people living in a temperate climate. Why? Adams, C. C.: *A Textbook of Commercial Geography*, pp. 383–386 (Appleton). 5. Columbus, when he discovered America, landed on one of the Bahama Islands. Can you explain how he happened to reach this latitude? 6. What advantages and what disadvantages do you see in these islands as winter resorts? 7. The Bermuda Islands lie far to the east of South Carolina. Find out what their attractions are. Mill, H. R.: *International Geography*, pp. 708–709 (Appleton); Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 236–237.

3. Central America

Similarity of conditions to those in Mexico. — There is a striking similarity between conditions in these countries and those in the southern portion of Mexico. The mountains of Mexico extend on through Central America; and while all these countries lie in the tropics, the inhabitants avoid the extreme heat by locating their homes mainly on the highlands, as in Mexico. This places most of them near the Pacific coast. In Fig. 10 note how few people are found on the lowlands along the Gulf coast.

The northeast trade winds bring a heavy rainfall, especially along the east coast and on the eastern mountain slopes. At one point near the boundary between Nicaragua and Costa Rica there is on the average 100 inches of rainfall in a year. Compare that with the rainfall in your own state. Natu-

rally the vegetation is luxuriant. The dense tropical forests that occupy a large part of the land contain mahogany, rosewood, logwood, and other valuable cabinet and dyewoods. The agricultural products, also, are similar to those in southern Mexico; and minerals are likewise abundant.

As in Mexico, however, the mass of the people are ignorant, the governments are weak, and means of transportation are poor.

Attempts at a union of these countries. — Although the area of all Central America is smaller than that of Texas, it contains more political divisions than all the rest of the mainland of North America. Note their names and locations on Fig. 215. How many are there?

British Honduras is a British colony, and the Panama Canal Zone belongs to the United States. One might suppose that the others — all of which are republics — would be eager to form a union like our own. Indeed, such a union did exist from 1821 to 1845. Yet it was discontinued, because the various states could not agree with one another. A new plan for union has recently been made. The extent of their isolation from one another is surprising. There is not now a single railroad crossing the boundary from one of these countries into another. Naturally, they have found it difficult to understand or trust one another, and wars have therefore frequently occurred.

The questions of chief interest to us in this region. — Our chief interest in Central America concerns the Panama Canal. Why did we want the canal? And of what value is it to Central America?

Plans for a canal across the Isthmus of Panama began to be considered more than 400 years ago. The need was felt keenly when the Spanish transported treasure from Peru across the isthmus on mules. As many as 2,000 mules were used at a time for that purpose. It was again felt to be a very pressing need when people had to travel to California by way of Central America at the time of the gold rush of 1849. This need was felt still more at the time of our war with Spain in 1898, when merchant vessels and warships had to pass all the way around South America in order to go from one of our coasts to the other. The belief finally became general that we, ourselves, must build the canal, no matter how much labor and money it might cost.

The need of a canal across the isthmus

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Fig. 226. — A typical oxcart in Central America

The oxcart is a symbol of undeveloped land transportation. There are few railroads in Central America. Trace them on your map. Highways are few and poor except near a few cities.

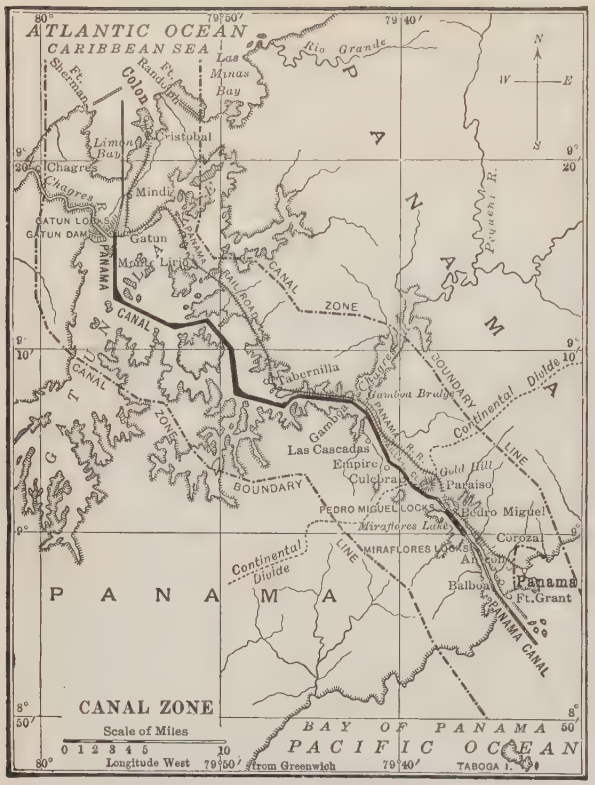

Fig. 227. — The Panama Canal Zone

The site selected, a strip of land only ten miles wide, is near the narrowest part of the isthmus. This is known as the Panama Canal Zone (Fig. 227). It is leased from Panama by our government and is fully under the control of the United States, with some exceptions in the case of the cities of Colon and Panama. Locate these (Fig. 215).

The site selected

One of the greatest difficulties in building the canal was the menace to health in the wet, tropical climate, particularly danger from the plague, malaria, and yellow fever. Accordingly, the first great step in the task was to exterminate as completely as possible animals that spread pestilence, such as rats, fleas, and mosquitoes; to make the buildings rat proof; to provide good drinking water; and to make other conditions sanitary. Panama City and Colon had long ranked among the worst pestholes in the world, and it had been supposed that such conditions were unavoidable in that climate. But they were soon made as healthful as many of our own cities.

Some of the difficulties that were met

Another difficulty consisted in the fact that it was necessary to cut through the Western Cordillera, which, though only about 400 feet high at this point, presented a serious obstacle. This was overcome partly by a deep cut and partly by so constructing the canal that all vessels are lifted eighty-five feet above the level of the sea in passing through it. This required enormous locks near each end, which were very difficult to construct.

The canal was completed in 1914, having been built in ten years at a total cost of $367,000,000. The greatest single advantage to the United States is, probably, the fact that the distance by water between our eastern and western coasts is tremendously reduced; for example, that between New York City and San Francisco is reduced to 5,300 miles, which is considerably less than one half the former distance. The distance from New York to the west coast of South America is, likewise, greatly reduced; for that coast can now be reached by sailing almost directly south from New York, instead of going around South America and coming up on the west side. Trace this course. Make a rough estimate of the distance saved in going from San Francisco to Liverpool (Fig. 495).

Benefits of the canal

The influence on Central America itself is marked. The highlands there, on which the majority of the inhabitants live, are near the west coast. Most goods that are exported or imported must be taken to the Pacific coast,

for in all these countries there are only three railroads that run from ocean to ocean, and wagon roads are few. Formerly such goods were usually shipped around Cape Horn.

The extent to which the canal is used is shown in the following table:

Vessels passing through the Panama Canal, whether east or west bound, in year ending June 30, 1919, 2,029.

Tons of cargo, 6,807,807.

Nationality of most of the vessels: American, 839; British, 623; Norwegian, 124; French, 96; Chilean 78; Japanese, 75; Danish, 74; Peruvian, 61; Dutch, 16.

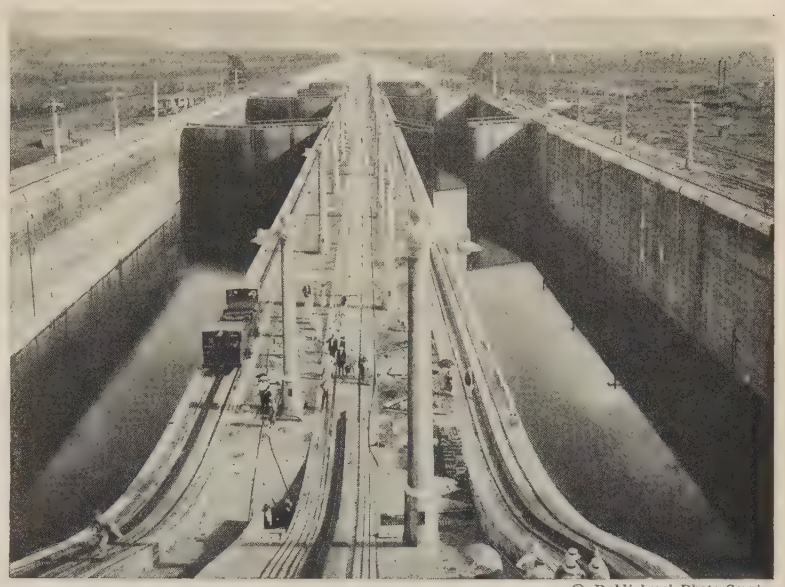

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Fig. 228. — The Gatun locks of the Panama Canal

Locate these locks in Fig. 227. At this point vessels bound for the Pacific are elevated from the level of the Caribbean Sea to that of Gatun Lake, eighty-five feet higher. How many locks appear in the picture? While passing through these locks, vessels are moved by electric locomotives on the tracks beside them.

Prospect of progress in Central America. — When the number of inhabitants of the Central American countries is compared with their area (p. 190), it is seen that their population is sparse. For example, Nicaragua, which is larger than Pennsylvania, has only about one tenth the population. With better education, better government, better roads, and other improvements, they could support many times their present number.

In increased population

Among the principal natural drawbacks are the facts that the surface is very mountainous and that the region is subject to eruptions of volcanoes and violent earthquakes. Nothing, of course, can be done to overcome these; but it is reasonable to expect improvements in education, government, and transportation.

The chief export at present is bananas; coffee ranks next. *Cacao*, consisting of the dried seeds of a tree grown in these countries, is also an important export, for from it chocolate and cocoa are made. Many foreigners have invested in plantations in these countries, on which bananas, coffee, sugar, cacao, rubber, and cotton are grown. Yet they have made only a beginning. The quantity of all these products could be very greatly increased; and, since there is a pressing need of each, the service of Central America in helping to feed the world will undoubtedly be multiplied many times.

In increased production

The success of our experiment in sanitation in the Canal Zone has proved that it is possible to make even these tropical lowlands healthful. This is an extremely important discovery for Central America. The example of stable government in their midst, as furnished by the United States in the Canal Zone, is also sure to have a steadying influence. Costa Rica has already shown much ability for self-govern-

In better government

ment, and largely for that reason has attracted much foreign capital. Nicaragua is beginning to appreciate the importance of education. The industries that the foreigners are helping to establish in all these countries, together with the ideas and habits that they are encouraging, are other helpful influences.

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Fig. 229. — Unloading bananas at New Orleans

Can you suggest how this apparatus works?

With all these examples before them, with the other advantages brought by the canal, and with their natural resources, the Central American states seem likely to make rapid progress.

Facts to be especially well fixed. — 1. The temperature regions and the distribution of rainfall. 2. The names and locations of the eight political divisions. 3. The main products. 4. Leading facts about the surface. 5. About the distribution of population. 6. Location and importance of the following: Panama Canal; Panama City; Colon; Gatun Lake; Gaillard Cut; Chagres River. See Fig. 227.

Problems for independent study. — 1. It is far more difficult to build and to keep up wagon roads in Central America than in the United States. Why? George, M. M.: *A Little Journey to Mexico and Central America* (Flanagan). 2. The climate of Central America is "so good to man that it spoils him." How can that be? 3. There has been some discussion of a through railroad from Buenos Aires to New York City. How might such a road benefit Central America? 4. Corrupt political leaders in Central America have opposed such a road. What reasons can you imagine for such opposition? 5. Some of the cities in Central America have been destroyed several times by earthquakes. Find examples. How must such a danger influence the construction of buildings? National Geographic Magazine, 1919, vol. 36, pp. 185–212; Tarr, R. S.: *New Physical Geography*, pp. 131–132 (Macmillan). 6. How many of these countries are larger than Ohio? How do they compare with Ohio in population? 7. There was formerly much talk of locating the canal in Nicaragua. Locate the proposed Nicaragua route and find the arguments both for and against it. George, M. M.: *A Little Journey to Mexico and Central America*, pp. 51–53: Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 210–216 (Macmillan).

VIII. Review of North America

1. Extent of our Natural Resources

Comparison of the United States with other countries of North America in area, population, and location. — In spite of its vast area our country, even including Alaska, is not the largest on the continent. What other country has a greater area, and how much greater is it? How does our country compare in size with Mexico? In population, however, the United States is by far

the largest. How many inhabitants has it? How many has Canada? Mexico? Central America? What is the population of the entire continent?

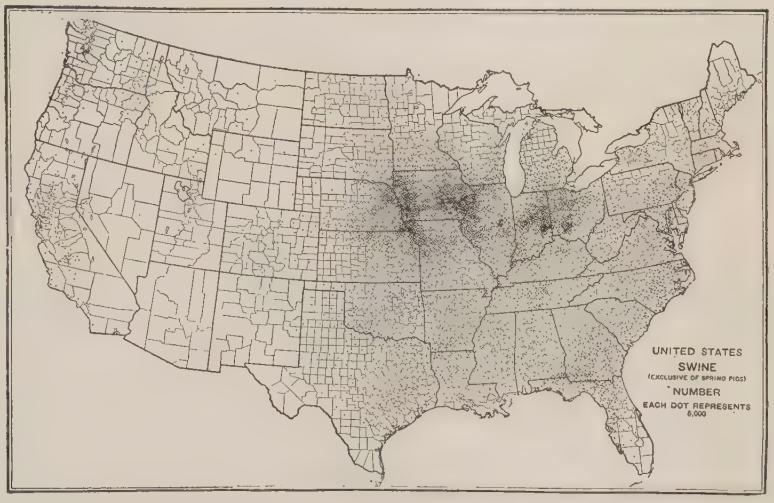
Why has the United States so far surpassed the others in population? What section of Canada is nearly useless on account of the extreme cold (Fig. 12)? What sections of Mexico and Central America have been of little value because of the heat? Our climate, on the other hand, is temperate. What is the latitude of southern Florida? Of the northern boundary of Minnesota? Beyond question we occupy the most desirable part of the continent; and it is largely because the climate is so favorable to various industries that our population is so great. State the character of the summers and winters in different parts of the United States as indicated in Fig. 12.

The sources and quantities of our principal raw materials. — Where are our principal raw materials for food, clothing, and shelter produced? Are they ample to meet our needs even in the distant future?

Our greatest food crop is corn. Name the states in the Corn Belt (Fig. 70). In what other section of the continent is corn extensively raised (p. 96)? How do the four groups of states compare in corn production? How do you account for the differences? About how many bushels does the United States produce per year (p. 65)?

Of our raw foods

How many bushels of wheat do we produce (p. 65)? The United States and Canada are two of the very few countries in the world that raise more wheat than they consume. In Fig. 205 note the amount grown in Canada. What explanations can you give for the location of our principal wheat sections (p. 65)?



From The Geography of the World's Agriculture (1910)

Fig. 230

In what sections of the country are hogs extensively raised (Fig. 230)? How do you account for their leadership (p. 71)?

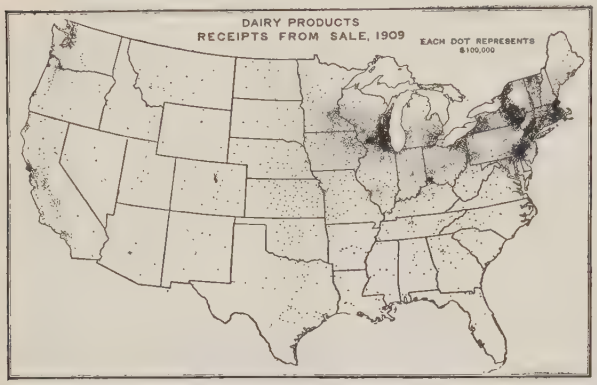
Cattle are far more widely distributed than hogs, as can be seen by comparing Fig. 73 with Fig. 230. Why should that be? What are the leading cattle-producing districts? Can you suggest reasons for their prominence? Fig. 231 shows the distribution of dairy products. Why do certain parts of our country surpass the others in this industry?

Fig. 166 shows where our sheep are raised. Why are there so many more in the West than in other sections (p. 146)?

What kinds of fruit are abundant in the Northeastern States (p. 56)? In the South (p. 97)? In the West (pp. 140 and 153)?

What fruits are especially common near the Great Lakes? Why do they thrive there? What fruits are grown chiefly in Florida and California (pp. 109 and 141)? From what region are most of our bananas obtained (pp. 202 and 207)?

From what two agricultural products is most of our sugar manufactured? Which state is most noted for sugar cane? What



From The Geography of the World's Agriculture

Fig. 231

advantages has it for that crop (p. 106)? What states grow the most sugar beets (p. 143)? How does the amount of cane sugar grown within the United States compare with that of beet sugar (p. 142)? Which of our outlying possessions produces large quantities of sugar (p. 174)? What other North American country produces vastly more sugar than the United States (p. 202)? What is the prospect for an increase of cane sugar in the South (p. 107)?

In which of our states is rice grown (pp. 108 and 140)? What peculiar advantages have our Southern States for the growth of rice (p. 107)? What prospect is there for a great increase in the amount raised?

Where are oysters most abundant (p. 57)? Salmon (pp. 157 and 169)? Where are cod principally caught? In what regions to the north of us is fishing the chief occupation (pp. 169 and 188)? Why?

Of our raw materials for clothing

What fixes the limits of the Cotton Belt? What other section of the United States has recently begun to raise cotton (p. 141)? The amount of cotton grown by us each year is about 11,000,000 bales, which is nearly one half of the world's supply.

Our leather and wool come mainly from cattle and sheep. From what states, therefore, must leather come? Wool? Where are both chiefly used in manufacturing (p. 45)? The other two chief materials used in making clothing are silk and linen; but we produce practically no raw material for either of these. We raise some flax, the plant from the fiber of which linen is made; but the fiber is not used by us, the flax being grown for the linseed oil that is manufactured from the seed.

Of our lumber supply

The principal forest areas of the United States are indicated in Fig. 14. Where are the hardwoods chiefly found? The soft woods? Make as full a list as you can of the trees of each kind. What facts can you recall about the extent of the lumbering industry in the South (p. 116)? In the West (p. 156)? What section of the country must be our main source of lumber in the near future (p. 156)? Upon what other country have we already begun to be partially dependent for our lumber supply (p. 92)? Locate the two chief forest areas in that country (pp. 176 and 181).

Of our metals

While gold and silver are called the precious metals, the metal that is most useful and therefore most important is iron. Give some idea of the extent of its use. There is one state that far surpasses all the others in its output of iron ore. Which one is it (p. 82)? In what other states is iron ore mined (Fig. 4)? What would be some of the consequences if the mines in Minnesota were to become exhausted? What regions would be seriously affected in manufacturing? What other North American countries contain deposits of iron ore that rival those in the United States? Locate their chief deposits more accurately (pp. 197 and 202).

The metal next in importance to iron is copper. Which states produce copper extensively (Fig. 153)? Which of these states seems to you most favorably located for shipping the copper to manufacturing districts? Why? What outlying territory of the United States produces copper (p. 170)?

In Fig. 153 locate the sections in which gold and silver are mined. What outlying territory of the United States produces gold (p. 169)? What other countries in North America produce silver (pp. 179 and 197)?

In which of our states are lead and zinc mined extensively (Fig. 153 and p. 82)?

Our sources and quantity of power for manufacturing. — Many raw materials are useless without power for manufacturing. How extensive is our supply of such power?

Our principal fuel is coal. One state alone produces about as much coal as all the others together. Which one is it? How much does it mine per year? How many tons of coal, per person, are mined in the United States each year?

Fig. 4 shows the distribution of the coal beds. What sections of the country are well provided with them? What sections are poorly provided?

Another valuable fuel is oil. In what sections is it found in large quantities (Fig. 30)? In what section is it extensively used for locomotives and in factories (p. 150)? What other kinds of engines make very extensive use of oil products for power?

A third important source of power is water in motion, often called *white coal.* Why is that a fitting name? How did the Ice Sheet affect our supply of water power (p. 10)? Which states have thus far most benefited from these effects (p. 34)? What rivers can you name whose falls produce a great amount of power for manufacturing? How does it happen that many irrigation plants in the West are also important as power plants (p. 138)? What important source of power do we share with a neighboring country (p. 34)?

Extent of manufacturing and location of leading kinds. — With raw materials and power so abundant, our opportunities for manufacturing are almost unlimited. How full a use are we making of these opportunities?

Our greatest manufacturing industry is the production of iron and steel and articles made from them. The greatest center of this industry is Pittsburgh, for reasons which you may recall (p. 42). Almost all the large cities in the Northeastern States are engaged in some forms of this industry; but they vary according to their peculiar advantages. For example, New England

produces very different goods from those of Pennsylvania and neighboring states. Explain what they are and account for the differences. The cities in northern and eastern Ohio closely resemble Pittsburgh in the nature of their iron and steel products. Why should they? Why are Chicago and Gary likewise noted as centers of iron and steel manufacture? What city in the South is most noted for the same industry (p. 120)? What peculiar advantages does it enjoy even over Pittsburgh? In what section of Canada is the iron and steel industry important (p. 177)?

In the North Central States, which excel the others in food products, four kinds of manufacturing are highly developed. One is the manufacture of flour. What flour centers can you name there (pp. 76 and 84)? Another is the preparation of meat. What city leads all others in the world in that occupation? Name several other cities that are also noted packing centers. A third important industry in the Middle West is the manufacture of farm implements. In what city is such manufacture most extensive? Why have Detroit and Indianapolis become leading cities for the manufacture of automobiles?

Two sections of our country now rival each other in the production of cotton goods. What are they? Fig. 134 shows the cotton mills both in the South and in New England. How do they compare in number? Yet there is a marked difference in the kinds of cotton goods made in these two sections. What is it? What is the cause of this difference (p. 117)?

Woolen and leather goods are manufactured in many sections of the country, but New England surpasses all the others in these industries. What are its advantages and disadvantages for such work (p. 45)?

While we produce no raw silk, nevertheless we lead the world in silk manufacture. Paterson, in New Jersey, is our leading center for that industry. What kinds of manufacturing are prominent in the West (p. 149)? Which of the four groups of states leads in manufacturing?

Importance and extent of our transportation routes. — Since the different sections of our country are very dependent upon one another, there is an enormous demand for means of transportation. Without our highly developed transportation systems our whole plan of living would have to be modified.

Our waterways are very extensive, as indicated in Fig. 11, there being in all about 25,000 miles of navigable water routes. Name some of the more important. Which portion of the country is least supplied? There is one waterway that is far more important than any of the others (p. 73). Describe it and state the reasons for its special importance.

The railroads greatly surpass the waterways in the quantity of freight carried, as is suggested by the fact that the mileage is about 266,000. How does that compare with the mileage of water routes? The extent of their traffic and some of the principal goods that they carry are indicated in Fig. 232. The chief railroads over which traffic passes on its way from the Middle West to the Pacific coast are called *transcontinental* railroads. How many do you find on this map? Note that on the lower side of each line are named some of the things that are hauled westward, while above the line are some that go east.

Name some of the goods carried west on the different roads; some that are carried east. Can you explain in each case why such goods are carried? What goods are carried south? What goods go north? Fig. 233 shows the more important railroads. Which section is best provided with them? Which has the smallest mileage? Can you account for the difference?

The chief occupations of our population.—The seven great occupations are agriculture, lumbering, fishing, mining, manufacturing, transportation, and trade. Each of these employs many thousands of men in the United States.

The first four of these occupations furnish the raw material for food, clothing, and shelter; owing to the nature of these occupations, most of the people engaged in them live in the country or in the smaller towns.

Most of those employed in manufacturing, transportation, and trade live in cities in order to carry on their

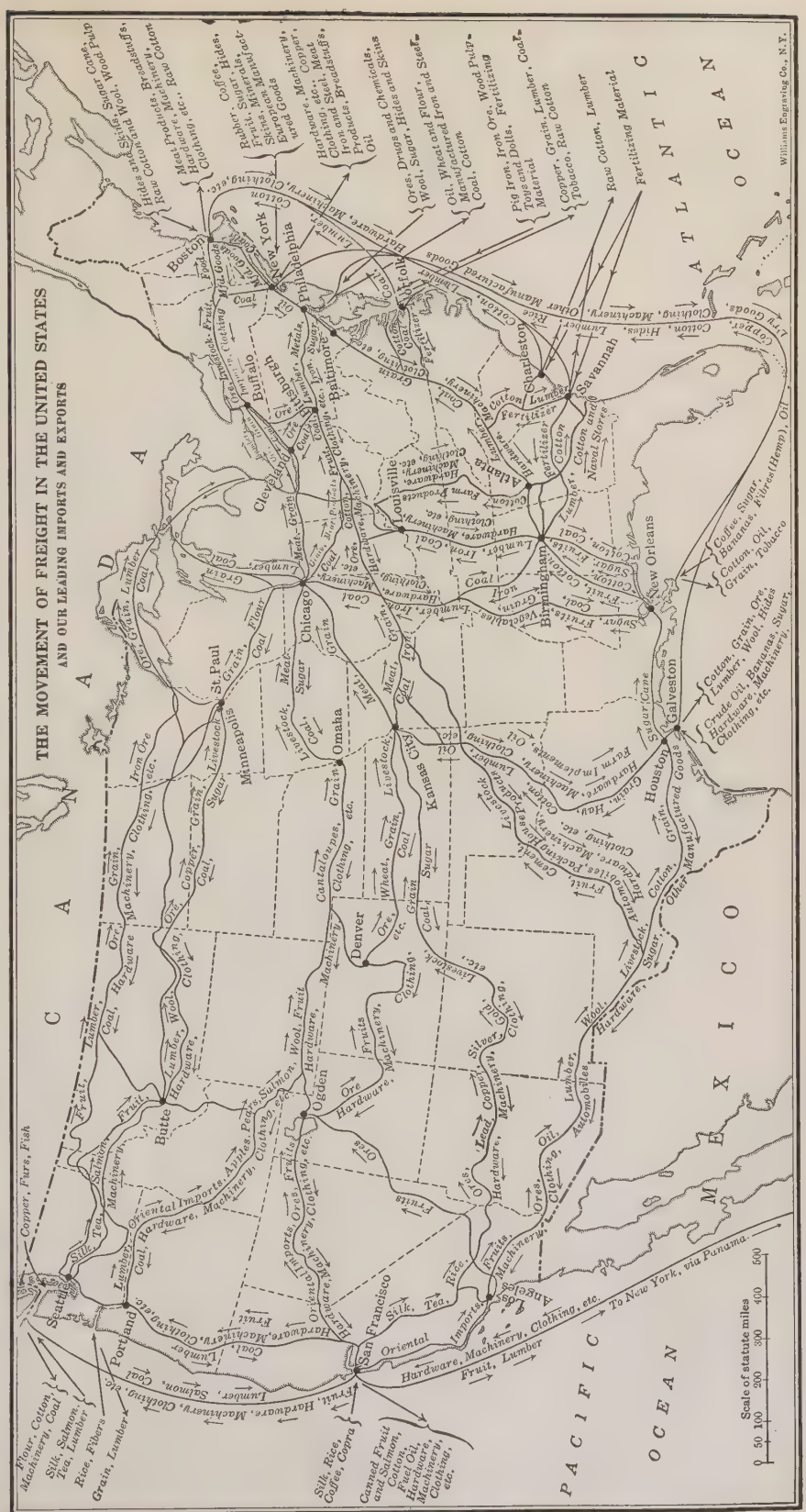


Fig. 232

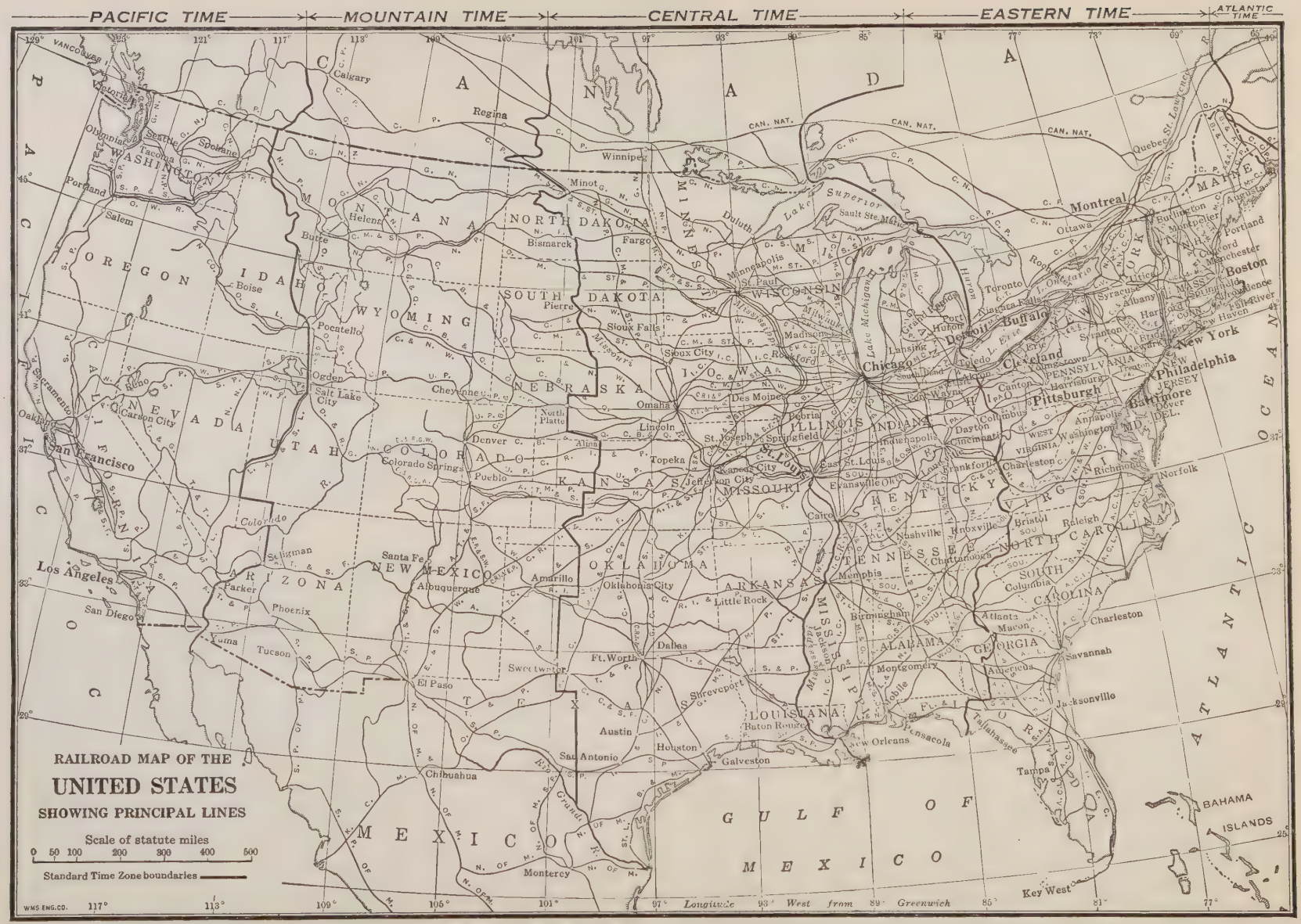

PACIFIC TIME
MOUNTAIN TIME
CENTRAL TIME
EASTERN TIME
ATLANTIC TIME
RAILROAD MAP OF THE
UNITED STATES
SHOWING PRINCIPAL LINES
Scale of statute miles
0 50 100 200 300 400 500
Standard Time Zone boundaries
Longitude West from Greenwich
CANADA
MEXICO
GULF OF MEXICO
ATLANTIC OCEAN
PACIFIC OCEAN
WASHINGTON
OREGON
CALIFORNIA
IDAHO
NEVADA
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINE
VERMONT
NEW HAMPSHIRE
MASSACHUSETTS
RHODE ISLAND
CONNECTICUT
NEW JERSEY
DELAWARE
MARYLAND
BAHAMA ISLANDS
Vancouver
Victoria
Seattle
Tacoma
Olympia
Spokane
Portland
Salem
Calgary
Regina
Winnipeg
Minot
Fargo
Bismarck
Helena
Butte
Boise
Pocatello
Pierre
Sioux Falls
Sioux City
Omaha
Lincoln
North Platte
Cheyenne
Denver
Colorado Springs
Pueblo
Salt Lake City
Ogden
Reno
Carson City
Sacramento
San Francisco
Oakland
Los Angeles
San Diego
Phoenix
Yuma
Tucson
Parker
Seligman
Santa Fe
Albuquerque
Amarillo
El Paso
Sweetwater
Fort Worth
Dallas
Austin
San Antonio
Houston
Galveston
Chihuahua
Monterrey
Topeka
Kansas City
St. Joseph
Jefferson City
St. Louis
Springfield
Peoria
Des Moines
Minneapolis
St. Paul
Duluth
Milwaukee
Madison
Chicago
Rockford
Sault Ste. Marie
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Detroit
Toronto
Buffalo
Cleveland
Akron
Canton
Toledo
Fort Wayne
Lansing
Grand Rapids
Port Huron
Indianapolis
Cincinnati
Columbus
Dayton
Evansville
Louisville
Frankfort
Lexington
Cairo
Nashville
Knoxville
Chattanooga
Memphis
Little Rock
Oklahoma City
Shreveport
Baton Rouge
New Orleans
Vicksburg
Jackson
Birmingham
Montgomery
Mobile
Atlanta
Macon
Columbus
Americus
Savannah
Charleston
Jacksonville
Tallahassee
Pensacola
Tampa
Key West
Bristol
Roanoke
Lynchburg
Richmond
Norfolk
Charleston
Harrisburg
Pittsburgh
Scranton
Albany
Syracuse
Rochester
Niagara Falls
Utica
Ottawa
Montreal
Quebec
St. Lawrence R.
Burlington
Montpelier
Concord
Manchester
Portland
Augusta
Boston
Providence
Fall River
New Haven
Hartford
Bridgeport
Newark
New York
Philadelphia
Baltimore
Dover
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Fig. 233

work most successfully. Thus 48.1 per cent of our population live in the country and 51.9 per cent in the cities or towns containing 2,500 or more persons. Name from memory the ten largest cities in order of size and compare the list with that on p. 481 to see how nearly correct it is. Show by several examples how very dependent city and country people are upon each other.

The more advanced nations of the earth have usually passed through two stages of growth, or of civilization, and are now in the third stage. In newly settled lands men have depended mainly upon hunting and fishing for food and clothing. We call them pioneers, and the stage of civilization which they represent, the *pioneer stage.* Gradually, as new settlers have arrived, agriculture has been taken up, and the *agricultural stage* has been reached when this has become the chief industry. The third or *manufacturing stage* arrives when manufacturing has been so extensively developed that it forms the chief occupation of the population. Our country is now in this stage.

How much farther our manufacturing will develop remains to be seen. We still produce more from the soil than we consume, but not such an excess as formerly. As our population grows and the number engaged in manufacturing increases, we may find ourselves dependent upon other parts of the world for a large part of our food, just as some of the nations of Europe now are.

2. The Conservation of our Resources

Our obligation not to waste our resources.— The consumption of our resources has, in general, increased at an astonishing rate during the last twenty years. The following table shows the extent of our production of a few raw materials in some years of this period. Observe that, with the single exception of lumber, these figures have increased with alarming rapidity. How do you account for the decrease in lumber production?

The increasing demands made on our resources

	1900	1910	1918
Wheat	522,230,000 bu.	635,121,000 bu.	921,438,000 bu.
Lumber	34,780,513,000 bd.ft.	40,018,282,000 bd.ft.	31,890,494,000 bd.ft.
Coal	141,230,000 T.	457,834,000 T.	674,121,000 T.
Iron ore	27,553,000 T.	57,015,000 T.	69,658,000 T.
Copper	270,588 T.	482,214 T.	892,203 T.
Petroleum	63,621,000 bbl.	209,557,000 bbl.	355,928,000 bbl.

Thus we are making enormous demands on our soil, our forests, and our mines. No country has ever before consumed its natural resources at such a rate. We average nearly five acres of improved land to each one of our inhabitants, while some foreign countries average less than one acre. On that account we are able to supply ourselves far more liberally with food than many other countries. And our supply of other materials is correspondingly greater than theirs.

But what about the distant future? We are one of the very young nations of the earth and our population is only a small part of what it may become. In 1890 our inhabitants numbered only 62,948,000; in 1900 they were 75,995,000; in 1910 they were 91,972,000; and now we number 105,709,000. At this rate we shall have at least 150,000,000 by 1950 and a century after that possibly several hundred million. Will there then be ample resources for so many people?

Why we are under obligations to be saving

There was a time when our resources seemed to have no bounds. The immigrants coming here from the small countries of Europe were greatly impressed with the bigness of our territory. Its forests seemed limitless

and its farm lands equally vast. Some forty or fifty years ago the children in our schools were singing, "Uncle Sam is rich enough to give us all a farm." Many have had a similar feeling about our supply of coal and of minerals.

Yet none of these treasures is by any means inexhaustible. Should their consumption continue at the ever increasing rate of the last twenty years, it will be only a few decades at the most before some of them will be exhausted. Thoughtful people have for a long time been pointing out this danger, but not until about the year 1908 did interest in the subject begin to be general. In that year a large number of public men met for a conference on the matter, and a National Conservation Commission was appointed to make an inventory of our resources. Since then many people have come to realize that our resources are very definitely limited and that they must be protected from exhaustion with the greatest possible care.

The soil, forests, coal, ores, and oil are valuable properties that we have a right to use; but we have no excuse for extravagance or wastefulness in their use. They belong in part to future generations and must be conserved in part for them, being held by us in trust. How long a time it took to form our coal you can, no doubt, recall (p. 5). Our other minerals have likewise required millions of years to be collected in beds and veins; and the production of soil is also the result of ages of change. Even our forests represent generations of growth, and some of those that we most prize are hundreds of years old; indeed, a few of the Big Trees of California have been growing since before the time of Christ. If, therefore, these treasures are extravagantly used by us and exhausted there is no way of making good the loss. In that case future generations will be deprived of their rightful inheritance because we have been grossly selfish and untrue to a trust.

How we have been meeting this obligation. — How have we been meeting this obligation? First, how have we been meeting it in regard to the soil?

We have been very careless in two ways. In the first place we have neglected to maintain the fertility of the land. In some of the Southern States phosphates have been extensively used. Recall the states that produce large amounts of it (p. 112). In many localities barn manures and other fertilizers have been spread upon the fields in large amounts. But a great many farmers have developed bad habits, owing partly to the supposed abundance of land. They have grown crops year after year without using fertilizers until the soil has become too sterile to produce good crops; then they have moved away to new lands farther west. A good many farms in the East have been abandoned partly on this account. Many other farmers have not fully understood that fields can be starved as truly as animals can be, and have gone on raising smaller and smaller crops each year, until they can scarcely make a living. Often the methods of agriculture have contributed directly to the exhaustion of the soil, for many farms in the South, for example (p. 111), have raised one crop for long periods of years until the soil has become very much exhausted. In every part of our country there are now great numbers of fields that are suffering from lack of fertilization.

Our carelessness in regard to the soil

1. Our failure to fertilize it

The other mistake is even worse, for it has led to the complete destruction and

loss of quantities of soil. It is the work of running water to carry away anything loose that it can find, and loose soil is its chief burden. How it does its work you can see on any roadside or hillside. If grass or forest or other vegetable growth covers the ground, the decaying matter, consisting of leaves and rotting wood, acts as a sponge to absorb much of the water, or at least delays its flow over the surface, and the roots, gripping the soil firmly, hold it in its place. Where, however, there is little or no vegetation, the running water is fearfully destructive. The newspapers often tell of disastrous washouts along the railroads in the arid regions of the West; and, no doubt, many readers wonder how there can be such destructive floods where there is so little rain. The explanation is simple enough. While the storms there are few, the rainfall at any one time may be so heavy that the water collects rapidly, and there is little vegetation to check its flow. Consequently, small rivers soon form that tear off and carry away the soil, wash out stretches of railroad, and cut up the ground so badly into furrows and gullies that it is almost impassable. Such lands are often named *bad lands* partly because the rains have made them useless; they are found in many arid districts in the West.

2. Our failure to protect it from damage by water

In many parts of our country men have directly aided this action of the water by their treatment of the land. They have cut away forests on the steep mountain slopes and hillsides, and then in many cases have plowed the land for crops. The crops that they have raised, too, like cotton and corn, have required that the fields be kept as "clean" as possible during the growing season, and year after year have left the soil bare and exposed during the winter. In such places there is nothing to check the collection and flow of water. In consequence the spring floods are higher than they used to be; the rushing waters have washed away much of the soil from many of the steeper slopes, and have so cut up many of the more level sections by gullies or so covered them up with sand and gravel brought down from higher levels that hundreds of acres of land are nearly useless. See if you can find any such ruined land in your neighborhood (Fig. 234). Millions of tons of the finest soil — which is the most valuable of our resources — are thus carried away every year by running water and completely lost.

Fig. 234. — A productive field destroyed by erosion, Tennessee

Through careless tillage the water after heavy rains began to cut small gullies in this field. Nothing was done to check erosion, and this is the result.

Have we protected our forests? While wood is not so valuable as soil, we could hardly do without it. The Eskimos value it almost as we do the precious metals, and if we were deprived of it as they are we should soon come to regard it as they do.

Our carelessness in regard to the forests

One difficulty here, again, is that the early settlers fell into bad habits in their treatment of the forests; and these habits have con-

tinued more or less down to the present time. Wanting to till the soil and believing that the best farm lands were those that produced the broad leaved trees, they cleared away the timber from these lands. That was so big a task that they came to regard the oaks and hickories and beeches and walnuts as worse than a nuisance; they regarded them as real enemies that ought to be destroyed as quickly and completely as possible. The amount of lumber that they needed for building and other purposes was so small, compared with the quantity of timber about them, that there was no influence to check such ruthlessness. So they cut down magnificent trees, dragged the logs into piles, and burned them. Even destructive forest fires, provided only trees were burned, were often welcome.

Many persons have only partially recovered from this inherited feeling toward trees. Others who have not cherished it have nevertheless imagined that our forests were practically inexhaustible. On that account they have cut away trees freely and have made any use of them that they wished. For example, in order to obtain naval stores (p. 116), they have tapped the hard pines over vast areas in the South in ways that have usually killed them within five years, although other methods could have been followed which would have allowed a much longer life.

Meanwhile our just demands for lumber have been increasing at an astonishing rate. In consequence of all these influences working together, we are now using from seven to ten times as much wood per person as the wealthiest nations of Europe; and our timber is being consumed at least three times as fast as it is being produced.

Next to soil, fuel is probably our most important resource. How careful have we been in its conservation? We have acted as if the supply were unlimited. In the mines themselves it has been customary to leave about one quarter of the coal as a support for the roofs of the underground chambers, although at a little more expense substitute supports might have been provided, so that all the coal could have been mined. A few years ago it was estimated that in some mines two tons of coal were wasted to every ton put upon the market, being broken up into fine coal and thrown away. An enormous amount of coal is consumed in the production of coke; and the beehive oven that has been much used for the purpose is noted for its waste of fuel. Again, in firing furnaces and coal stoves, few persons know how to lay on the coal and regulate the draft so as to obtain the greatest possible heat from a given amount. The quantity of coal that can be seen in the average ash can waiting to be carried to the dump heap shows perhaps as clearly as anything how little we have thought about waste. While in spite of all our carelessness we have consumed less than one per cent of our available coal in the ground, our rapidly increasing demand for such fuel gives reason for fears about the future.

Our carelessness in the consumption of mineral products

1. In the consumption of coal

Have we taken any greater precautions in our use of oil and gas? It has been estimated that the quantity of gas that has been escaping during many years from our oil wells has been equal in value to hundreds of thousands of tons of coal every day. This gas has been of no use to us whatever. But our carelessness in regard to what we have used is nearly

2. In the consumption of oil and gas

as striking. For instance, in towns and cities where natural gas is provided, many of the street lights have been allowed to burn night and day. The wasted gas was considered of less value than the labor of turning it off. As might be expected, the supply in many places is already exhausted and in others it is not likely to last many more years.

Less of our oil has been wasted in securing it from the earth; but the difficulty here is the extravagance of our demands. Every American wants to own an automobile; and because the demand is greater than the supply, the price of oil is rapidly advancing, as in the case of lumber. The immense amount of gasoline that is burned purely for the pleasure of driving can easily be imagined when one sees the endless procession of pleasure cars passing along any important highway between a large city and the country.

The metals, being more difficult to obtain, have not been so much wasted. Yet we are mining them very rapidly; and our treatment of the other resources already mentioned is sufficient indication that we have not seriously considered whether or not we are leaving a fair supply of these minerals to future generations. Iron, copper, lead, zinc, and the precious metals can be melted and thus used over and over for different purposes. If we continue to consume them so lavishly we should at least settle upon carefully considered plans for conserving them.

3. In the consumption of metals

The reputation of our people for wastefulness. — Our people have been very energetic in devising and quick in supporting measures that promised to save life and property. For example, while cottonseed was formerly thrown away or used as fuel, it is now utilized for the production of several highly valuable foods. Recall some of them (p. 117). Our study of the winds and storms now enables us to predict the weather so as to protect life and property on land and sea. See if you can name a dozen other inventions or improvements that have likewise resulted in extensive saving. The number is large.

Our attempts to avoid waste

In spite of such advances, we have come to be regarded by many foreigners as both careless and extravagant to an unusual degree. In reaching this conclusion our critics have many other facts in mind as well as those concerning our use of natural resources. For example, we have almost exterminated the buffalo. The fur seal has barely escaped extermination. The whale, which also was once abundant in our surrounding waters, has become rare (p. 172). The existence of other wild animals, including important species of fish, has been seriously threatened.

Examples of our wastefulness

Figs. 73 and 166 show that a vast number of cattle and sheep are raised in our Western States, yet there is fearful loss of life among those animals, involving untold suffering. In the winter of 1918–19, according to government reports, 1,175,000 cattle and 900,000 sheep perished there from "exposure," which means from cold and starvation. Estimating each head of cattle at 500 pounds and each sheep at 60 pounds — which is moderate — you can calculate the loss in meat. What an enormous waste! Yet men who have studied the matter say that reasonable precautions would have prevented most of this loss.

No one class of our citizens seems more to blame than another in the tendency toward waste. It is very common for children

gathering flowers to pick all that they can find, in spite of the fact that the flowers are the seed-producing part of the plant from which future plants must grow. In addition, as if to destroy plant life completely, people burn over their ground in late fall or early spring, thereby killing great numbers of young plants and seeds, besides seriously damaging the thick layer of decaying vegetation, called *humus*, from which these obtain part of their nourishment.

How we can make use of our resources with least possible waste. — How can we prevent waste, particularly in the use of the soil? The coal, iron ore, copper, and other metals must some day become exhausted, no matter how carefully they are exploited. But fortunately the soil, if carefully treated, will last forever. Fields in China, Japan, and India that have been cultivated for forty centuries are still as productive as ever.

How we can get most from the soil without injury to it

1. Ways of increasing the quantity of land under cultivation

First of all, we should cultivate as much of the land as possible. The irrigation of arid areas in the West is a step in the right direction. What can you recall about the extent of irrigation there (Fig 135)? Dry farming in the West has, also, greatly added to our food products. What do you remember about it (p. 144)? In the South only a comparatively small part of the land suitable for cultivation is now being farmed. In what states is new land available (p. 111)? Swamps that have been well drained make some of the very best farms; and out of the 80,000,000 acres of swamp in the United States there are probably 40,000,000 that can be made productive by draining. How many 160-acre farms would that allow? For one reason or another only a small part of the land is under cultivation. In almost every locality there are vacant plots that could just as well bear crops. Are there any such in your neighborhood?

2. Methods of fertilizing the soil

In the second place, the soil should be kept fertile. The chief kinds of plant foods, or chief elements, that crops take from the soil are *phosphorus*, *nitrogen*, and *potassium*. Unless these are put back into it at least as fast as they are removed, the land is robbed. It may be several years before the effects of such robbery are observed in the smaller crops produced; but they are sure to come.

The harm caused by one-crop farming is plain, when one realizes that it subtracts the same elements from the soil year after year. How is this being remedied in the South at present (p. 111)? The soils in different sections vary greatly in quality, some needing one thing and others another to enrich them. Only scientific experts, who make a business of studying the soil, can tell what is wanted in any particular field, and in order to secure the best results they should be consulted.

3. Methods of preventing soil waste

How can the erosion of soil be prevented? There are several ways. In thickly populated countries where the surface is rough, the slopes are terraced extensively. Such terracing is shown in Fig. 449. Explain the plan as you see it there. What can you say about its cost? Are there any slopes in your vicinity that are terraced or that might well be? We have so much land per person that it has not yet been necessary to terrace much land.

Farm land that has gentle slopes should be plowed so that the furrows keep on a level instead of running downhill. Otherwise, the water may form a stream in each furrow that will wash the soil away rapidly. Such plowing is called *contour plowing*. See if this

precaution is practiced in the plowing of slopes in your neighborhood.

Probably the most important means of preserving the soil is not to attempt to cultivate the slopes, but to keep some sort of vegetation upon them; it may be forest, or grass, or orchard. In this way the fields below the slopes are protected as well as the slopes themselves. Explain how.

Conservation of the soil, as we have seen, is tied up with the conservation of the forests.

How a fair supply of timber can be assured for the future

1. Ways of economizing in the cutting and use of timber

How can the latter be conserved? One thing to do is to find more economical ways of cutting timber and of using wood. Trees are often cut too far above the ground, and when they fall they are allowed to destroy the smaller trees about them (p. 156). It also frequently happens that little more than one third of a tree that is cut for timber is used. In some European countries scarcely any part of a tree goes to waste. The stump is as low as possible and all parts of the log are utilized; even the sawdust is saved for the manufacture of alcohol, and the branches that are too small for other purposes are carried away for firewood. With us, however, all but the very choice part of the log is likely to be thrown away. If we saved all the waste in the logging and milling of our pines, including the stumps, we could manufacture from it a large part of the turpentine that we need; and if we were similarly saving in the logging and milling of spruce and certain other trees, we could manufacture from such waste a good portion of our paper. Charcoal and wood alcohol can be made from the waste of hard woods.

Economy should be applied to the use of lumber also. Boards, boxes, barrels, and other wooden articles that have been used once could often be used again instead of being thrown away or burnt. The life of shingles can be greatly lengthened by dipping them in creosote before putting them on the roof; and paint accomplishes the same purpose with all kinds of wood. Substitutes for wood also are available, such, for example, as brick, tile, cement, stone, and metal; and it is often economical to employ them. Such measures of economy have always been practiced to some extent; but they should become far more common. The advancing price of lumber will no doubt greatly aid in establishing them.

At the same time better protection of the forests is necessary. The measures to be taken for that purpose are best illustrated by the work of the *forest rangers* who are employed by our government. Timber has been so rapidly disappearing that it has seemed wise for the government to come to its protection. Accordingly it has taken over the forest areas shown in Fig. 235. Locate the larger areas in the West. What sections in the East and South are also under government control?

2. Methods of protecting the forests

The forest rangers look after the leasing of the forest land for grazing purposes. Another duty is to prevent and check fires. The average annual loss of timber by fires is estimated at $50,000,000, and some years it is more than $100,000,000; so that the importance of the task is evident. As many as a dozen forest fires have been known to be started by lightning in the course of a single thunder storm; many others are caused by careless campers and smokers, by sparks from locomotives, and in other ways.

In the summer, when the forests often become very dry, it is the chief duty of the

forest rangers to patrol them on the lookout for fires. Men stationed at high points are continually on the watch for columns of smoke, indicating the beginning of a fire; and when such a discovery is made a signal is given calling out the nearest force of fire-fighting men.

The rangers also supervise the sale and cutting of timber, allowing only the mature trees and those showing serious defects to be removed, and seeing that in such removal the young trees are not injured.

They replant areas that have been burned or cut, thus making thousands of acres useful that might otherwise remain idle. There is a very large amount of land available for timber, whose soil is too thin for any other purpose.

The rangers also fight the insect enemies of trees, of which there are many, sometimes cutting down and burning great numbers of trees that have become infected. The damage to vegetation wrought by insects is enormous, as is proved by the ravages of the boll weevil in the Cotton Belt (p. 105) and by the plant lice, chinch bugs, and other vermin in gardens and on farms. The study of their habits with reference to methods of destroying them has therefore become a very important science.

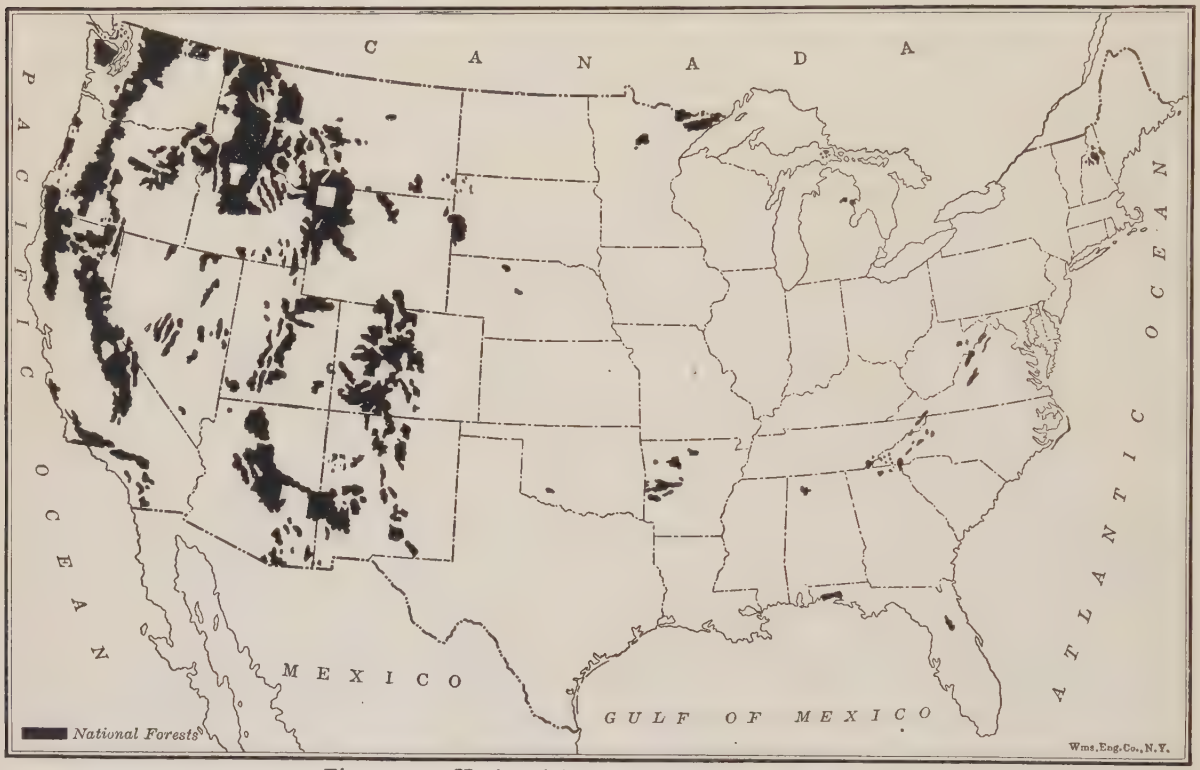

Fig. 235. — National forests in the United States

Such care of trees on the part of the government suggests some of the measures that might be followed in privately owned forests. In some parts of Europe a man is not free to cut down trees even upon his own ground, for the public is recognized as having some right in them. Many of our steeper slopes and lands that have thin soil should be reforested. A large number of our communities are already alive to these questions

and are taking steps to protect their trees. What measures, if any, do you think might well be taken in your community?

How shall we conserve our minerals? There are only two important ways in which the metals can be conserved. One is by painting those that rust easily. One often sees iron bridges and fences, water pipes on houses, mosquito screens, and other metal objects decaying rapidly because of exposure. Metal paint accomplishes the same purpose here that ordinary paint accomplishes in the case of wood. The other way is to make use of all scraps. Since iron, copper, and other metals can be used over and over, all discarded pieces, as, for example, old stoves, iron pipe, etc., should be melted up for further use. A very large amount of metal can be saved in this manner.

How our minerals may be better conserved

1. Methods of conserving our metals

Coal can be conserved at all stages of its production and use. The unnecessary waste in the mines has been mentioned, as well as that in firing. The loss with the ashes can be prevented by sifting. Much coal of poor quality can be made valuable if properly prepared. In Europe great quantities of dust-like coal are pressed into the form of small bricks, called *briquettes*, which are the only kind of fuel found in many places. These are now becoming increasingly common in the United States.

2. Methods of conserving our coal

There are still larger ways, however, of saving coal. One is to make fuller use of our water routes. We have an enormous mileage of navigable waters. Our railroads are often overtaxed to haul all the freight demanded of them. Yet the waterways are nearly idle, with one exception. Name it. And this is true even though the consumption of coal by water transportation is very much less than that by rail.

There is another even greater possible means of conserving coal, — by the use of "white coal." The electric power obtained from Niagara Falls runs the street cars and factories in Buffalo and surrounding places, doing daily the work of many thousand tons of coal (p. 34). One power plant on the Mississippi River is doing a similar work for towns in its vicinity. Recall its name and location (p. 73). The Chicago, Milwaukee, and St. Paul Railway system has electrified about 660 miles of its line in Montana and Washington. The water power used by this one railroad saves daily over 800 tons of coal.

There are many sections of the United States in which water power is abundant. All together there are from 40,000,000 to 60,000,000 horse power available in our rivers; and by the storage of flood waters in reservoirs this amount might be doubled. As one writer expresses it: "We have enough water power to operate every mill, drive every spindle, propel every train, and light every city, town, and village in the country." Think how much coal might in that way be saved! Yet only about 6,000,000 horse power is now being used. What per cent is that of the total supply? Water power can be conserved only by being used, and in that respect is unlike all our other resources. So long as it is unused it is wasted. What a lamentable waste, therefore, we are allowing!

The responsibility of each person for conservation. — Responsibility for conservation is something that does not fall upon the government alone, nor upon a few prominent persons. Every time any one wastes food or clothing, or allows boards to decay owing

to neglect, or consumes gasoline unnecessarily, or throws away scrap iron, he is making an inexcusable demand upon the soil, or the forest, or the mineral resources, raising present prices, and ignoring his obligations to future generations. Thus every one of us bears responsibility for practicing conservation. What opportunities do you see for it about you?

There is responsibility for conservation also in a broader way. The shade trees and birds should be more carefully protected in every community; fires should become less frequent, and injury to property less common. In order to bring about these and other similar improvements much thinking and argument are necessary; laws must be passed and enforced and people must be shown the evils of waste. Should boys and girls as well as men and women have a share in such progress?

Problems for independent study. — 1. Write a composition showing the importance of the work of the forest rangers. Include their influence upon the lumber supply, upon soil, and upon navigable rivers and harbors. Ladies' Home Journal, December, 1919, vol. 36, p. 147; The World Book, under the title *Forestry in the United States*. See same title in the New International Encyclopedia; Chamberlain, J. F., and Chamberlain, A. H.: *North America*, pp. 280–287 (Macmillan). 2. Compare the present prices of lumber with those of twenty-five years ago. 3. Find out how different kinds of coke ovens are made and operated. 4. Why were we urged to "eat more fish" during the World War? 5. Collect poems on the value of trees. 6. Find out how coal can be most economically used in stoves and furnaces. St. Nicholas, January, 1919, vol. 45, pp. 208–209; Century, February, 1918, vol. 95, pp. 602–604; Outlook, November, 1918, pp. 371–372; *Lessons in Community and National Life*, Series C, Lesson C–6 (Department of Interior, Washington, D. C.); Smith, W. P., and Jewett, E. G.: *An Introduction to the Study of Science*, pp. 93–111 (Macmillan). 7. Read the small book on *Conservation* written by H. W. Fairbanks and published by the World Book Company. 8. Make a list of examples that you have observed of waste of resources. *Lessons in Community and National Life*, Series B, Lesson B, on "Saving the Soil"; Series C, Lesson C, on "Conservation of Petroleum" (Department of Interior, Washington, D. C.); Van Hise, C. R.: *The Conservation of Natural Resources in the United States* (Macmillan). 9. Are other problems concerning conservation suggested to you by your own neighborhood?

PART II. GENERAL GEOGRAPHY

I. The Earth

Form and size of the earth. — The earth is a sphere with a circumference of approximately 25,000 miles and a diameter of about 8,000 miles. It is slightly flattened at the poles, however. For this reason, the line which extends through the center of the earth from pole to pole — called the earth's *axis* — is a little shorter than the diameter at the equator.

Proofs that it is round. — The earth is known to be round or spherical in shape, not only because people have traveled around it, but also because its shadow on the moon, as seen in an eclipse, is always round. A sphere is the only body that will always cast a round shadow. Can you give other proofs that the earth has the form of a sphere?

Its daily motion, and the results. — The earth is steadily turning, or rotating, about its axis. This motion has very important results. In the first place, it causes sunrise and sunset, and thus day and night. When we glance out of the window of a moving train, the objects that we pass appear to be moving in the direction opposite to that in which we are traveling, while we seem to be standing still. In a similar way the rotation of the earth causes the sun to appear to rise and set. Indeed, for a long time people believed that it was the sun that moved, and not the earth. Since we first see the sun in the east, it is plain that the earth is rotating from west to east. And since one complete rotation requires twenty-four hours, it gives us a day of that length.

By rotating a globe or any spherical body in the sunlight, show how day and night are caused on the earth. Hold the sphere still; what would be true about daylight and darkness on the earth if it did not rotate at all? What might be the effect upon life on the earth if the same side were always turned toward the sun?

The yearly motion of the earth. — The earth has another motion that is of very great importance. This is its *revolution* around the sun, which is illustrated in Fig. 236. The object shown in the center of the circle is the sun, as you see, and the circle itself shows the course that the earth takes in its revolution. This nearly circular path is called the earth's orbit. Thus you see that the earth is forever swinging around the sun, although that body is 93,000,000 miles from it. It takes a year to complete one revolution, as the dates in Fig. 236 show. Indeed, the time necessary for this great journey is what fixes the length of our year.

Effects of the earth's revolution. — The revolution of the earth and the constantly changing position of its axis with reference to the sun, as shown by Fig. 236, cause our seasons and the changing length of our day and night.

In Fig. 236 the lowest sphere, bearing the

date September 23, represents the earth as receiving the light of the sun from pole to pole. On that date day and night are equal everywhere upon the earth. It marks the end of summer and the beginning of autumn in the northern hemisphere.

Following the earth in its revolution (to the right), we find that, as the months pass, the north pole falls farther and farther into the shadow, until the farthest point is reached about December 21. That is the date for our shortest day and longest night. Farther north the nights are longer still,[1] and the Eskimos who live far within the Arctic circle are having a night that lasts week after week. It is upon this date, also, that our winter begins.

Show from Fig. 236 how this change is reversed during the other half of the year.

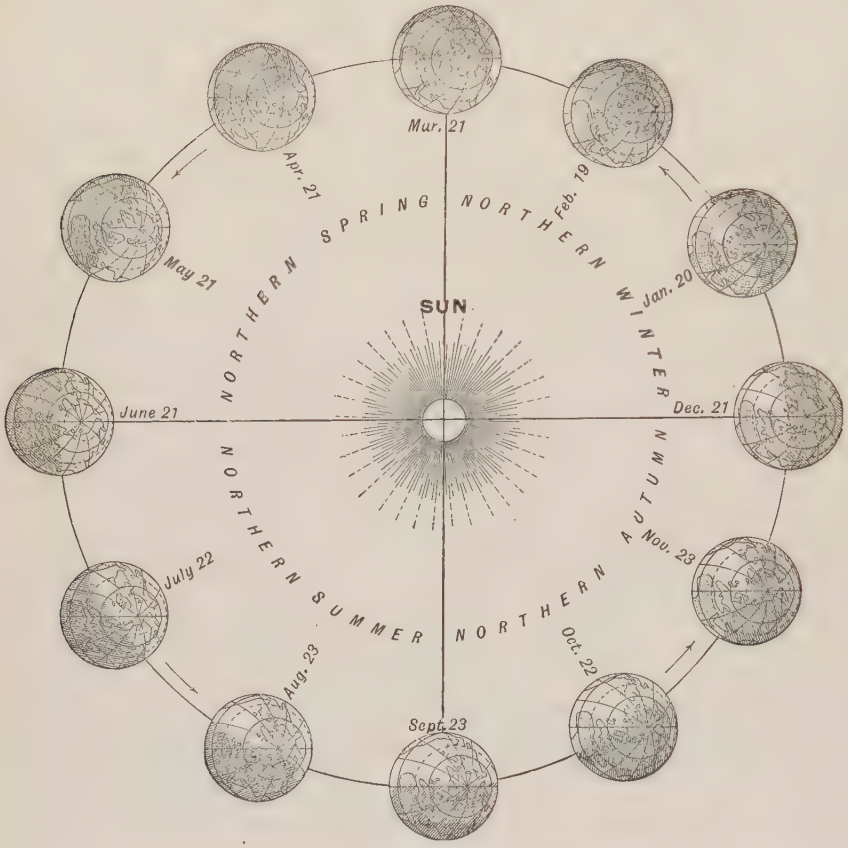

Fig. 236. — A diagram to illustrate various positions of the earth in its revolution around the sun

In a diagram like this it is impossible to show everything in its true proportion. With the earth represented as large as it is in this diagram, the sun should be five feet in diameter and the earth's orbit should be nearly 1,100 feet across. The shaded portions of the earth represent night. The north pole is the point on the earth's surface where the lines come together. The exact date when the earth reaches each point in its orbit varies slightly from year to year.

While these changes are in progress in the northern hemisphere, there are also changes in the seasons and in the length of day and night in the southern hemisphere. These changes are of the same kind, but the seasons are exactly changed about; that is, it is winter there when it is summer with us; and when the north pole is in darkness, the south pole is bathed in sunlight.

The zones. — Fig. 237 shows the so-called *zones* on the earth. How many are there? Name and locate each. The cause of the zones is found in the slant at which the rays of the sun strike

Cause of the zones

[1] Exactly at the pole the sun is above the horizon for six months and then below it for six months; there is continuous twilight for several weeks before it rises and after it sets.

the earth. In the torrid zone they are always either vertical, or nearly so. In the temperate zone, they strike the earth at a greater slant; and in the frigid zones at a greater slant still. On this account, the heat grows less and less as one approaches either of the poles.

The boundaries of the *tropical* (*torrid*) *zone* are easily fixed, because they mark the points farthest north and south where the sun's rays are vertical at some period of the year. On December 21, when the north pole is farthest within the shadow

Their boundaries

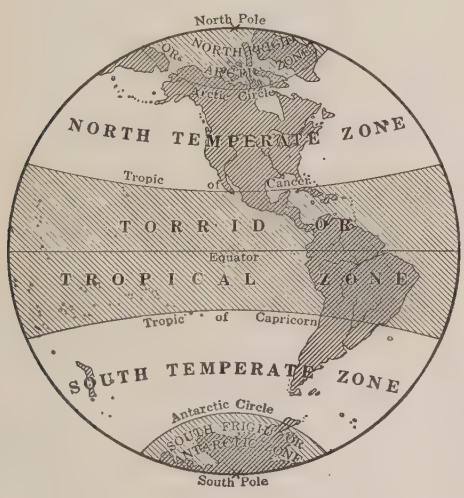

Fig. 237

(Fig. 236), the sun's rays are vertical at the Tropic of Capricorn. On June 21, on the other hand, when the north pole is farthest within the light, the sun's rays are vertical at the Tropic of Cancer.

The *north frigid* (*Arctic*) *zone* is the region around the north pole that lies entirely in darkness on December 21. The *Arctic circle* forms its southern boundary. On June 21, this same region lies entirely in the light. The *south frigid* (*Antarctic*) *zone* is the corresponding region about the south pole. Name its northern boundary.

The two *temperate zones* are merely the wide belts that lie between the torrid zone, on the one hand, and the frigid zones on the other.

The *zones* thus bounded are determined solely by our relation to the sun. On the other hand, the boundaries of the *temperature* or *heat belts* are quite irregular. See, for example, Fig. 12. See also p. 240.

How the earth's revolution causes our seasons. — Our seasons are likewise due to the slant at which the sun's rays strike the earth at different times of the year. On December 21, the midday sun is low in the sky in the region where we live, and then its rays reach us at the greatest slant. That marks the beginning of our coldest season (Fig. 236). On June 21, on the other hand, the midday sun is high in the heavens, and the rays are then most nearly vertical. That marks the beginning of our warmest season. Spring comes as the rays become more nearly vertical; and autumn as they grow less so.

Facts to be especially well fixed. — 1. The cause of day and night. 2. The explanation of the seasons. 3. The names and boundaries of the zones.

Problems for independent study. — 1. Show by a globe, or a ball, how the two movements of the earth, rotation and revolution, can be going on at the same time. 2. Are the days growing longer or shorter at present? 3. During which months do they grow longer? During which months, shorter? 4. At what time of day does your shadow always point directly north? 5. Notice how your shadow changes with the season in early morning; at noon; in the evening. 6. How long is the longest night where you live? The shortest? Consult an almanac. 7. Which zone has the slightest change of seasons? Why? 8. Show why the common notion that within the Arctic and Antarctic circles there is everywhere six months of day followed by six months of night is a mistake. 9. What season is it now in Australia?

II. Latitude, Longitude, and Standard Time

1. Latitude and Longitude

Need of some way of locating places exactly. — In a study of geography, it is often necessary to locate places exactly. This is not so easy as it might seem. For instance, suppose we wish to state where London is situated; how would it be done? Of course, it would be easy to describe the general location of this city; but some more accurate way should be found.

How houses may be located in cities. — The difficulty is similar to that which arises in locating a place in a large city, where there are thousands of houses. No one person knows who lives in most of them, and if a stranger were looking for a friend, he might have much trouble in finding his house.

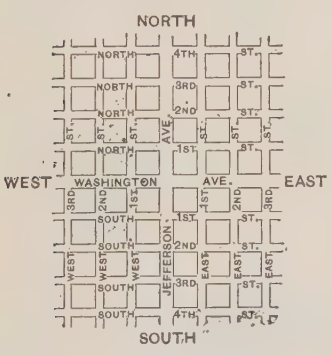

Fig. 238

A very simple means has been found for locating city houses. For example, a street running east and west may be selected to divide the city into two parts, as Washington Avenue does in Fig. 238. Any place north of this street is spoken of as being on the *north side;* any place south of it as being on the *south side.* The streets to the north of this central street are numbered as North 1st, North 2nd, North 3rd, etc.; those to the south of it as South 1st, South 2nd, South 3rd, and so on. Then if a man says that he lives on North 4th Street, we know at once that he lives on the north side, and that his house is on the fourth street from this central one.

But we need also to know on what *part* of North 4th Street this house is to be found. To answer that question, another street running north and south may be selected to divide the city into east and west sections. In Fig. 238, Jefferson Avenue is such a street. The streets on the two sides of it are numbered as East 1st, East 2nd, West 1st, West 2nd, etc.

Then if a man lives on the corner of North 4th and East 3rd streets, we know not only that his home is *north* of a certain line, but *east* of a certain other line. Thus the house can be located exactly.

How places can be exactly located on the earth. — Places upon the earth are located in much the same manner as in the city just described. The *equator* corresponds to the dividing street that runs east and west. The distance between the equator and each of the poles is divided into ninety parts (Fig. 239), each being about sixty-nine miles wide. This distance is called a *degree.* The sign for degrees is a little circle (°) placed at the right of a figure (Fig. 239).

How they can be located in a north and south direction

Lines are drawn upon maps and globes to represent these degrees. The lines on a globe extend completely around it from east to west, and are therefore circles. The first circle north of the equator, marked 1°, is about sixty-nine miles from that central dividing line; the one marked 2° is twice that distance, and so on. The north pole is 90° from the equator. The same plan is followed south of the equator. The distance from pole to pole is 180°, and the entire circumference of the earth, like that of any circle, is 360°.

All points on any one of these circles are the same distance from the equator and from each of the other circles. On that account these circles are called *parallels*. On Fig. 2, find the parallel for 10°; for 40°; what important cities are near the latter?

If one finds that a certain place is on the 8th or the 50th, or some other parallel, north of the equator, he knows how many miles it is north of that dividing line; for every degree is about 69 miles. San Francisco,

Fig. 239

for example, is close to the 38th parallel, and Chicago is close to the 42d (Fig. 11). Knowing this, you can easily see that Chicago is 4°, or about 276 miles, farther north than San Francisco.

Thus by the help of the parallels one can find how far any place is north or south of the equator. Instead, however, of saying that places are so many degrees *north or south of the equator*, we usually say that they are in so many degrees *north or south latitude*. San Francisco, for instance, is near 38° *north latitude* (abbreviated *N. Lat.*). *Latitude is distance north or south of the equator, measured in degrees;* and the parallel lines are called *parallels of latitude*.

Of course there are no marks upon the earth to show where these circles run. They are drawn on globes and maps, where they are of great use because they help to locate places. Small maps and globes cannot well show the entire ninety parallels on each side of the equator. That would make too many lines. For this reason, the parallels shown are usually several degrees apart. Examine some maps (such as Figs. 2 and 215) to see which ones are given. Near what parallel do you live?

How places can be located in an east and west direction

As in the city, some means must also be found for locating places east and west; for two points might be in 10° north latitude and still be several thousand miles apart. Show that this is true. Imaginary lines are used for this purpose, as before; but this time they extend around the earth from pole to pole (Fig. 239). These lines are called *meridians*.

In a city it makes little difference what north and south street is chosen from which to number the others. It is necessary only that a certain one be agreed upon. The same is true of these meridians. No one is especially important, as the equator is, and any one of them might be chosen from which to start. Indeed, different nations have selected different circles as the one from which to begin numbering. It is, however, important that all people agree on some one meridian to start from, so that all maps may be made alike. On that account, many countries begin their numbering with the meridian which passes through Greenwich, near London. The maps in this book follow that plan.

Beginning with the meridian of Greenwich, we measure off degrees both east and west. Thus there is a meridian 1° west, another 2°, a third 3°, etc. Going eastward, the meridians are numbered in the same way. Any

place on the third meridian *west* of Greenwich is 3° *west* of the principal meridian; if on the sixtieth meridian, it is 60° west.

Again, however, instead of saying that a place is so many degrees *east or west of the principal meridian*, we say it is in so many degrees *east or west longitude*. The place on the third meridian, just mentioned, is, therefore, in 3° west longitude. *Longitude is distance east or west of the principal meridian, measured in degrees.*

The distance around the earth from north to south, through both poles, is four times

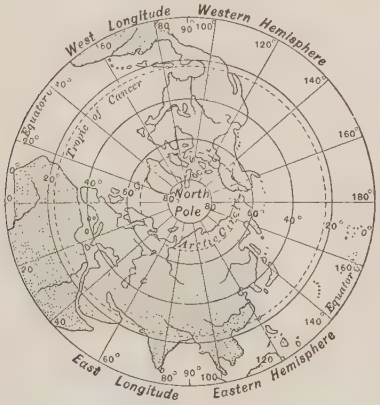

Fig. 240

A view looking down on the north pole, to show how the meridians come to a point at the north pole. Notice that if the 0° meridian were continued, it would unite with the meridian 180°.

90°, or 360° in all. The equator is likewise divided into 360 parts, or degrees. There are therefore 360 meridians, if they are drawn one degree apart. They are numbered up to 180° in both directions (Fig. 239). Thus, 180° E. Long. is the same as 180° W. Long. (see Fig. 239).

The meridians are not parallel, like the circles of latitude. They are farthest apart at the equator, where the number of miles covered by a degree of longitude is about the same as that covered by a degree of latitude. But all the meridians come together at the poles, as you can see on a globe or on Fig. 240. Therefore the length on the earth's surface of a degree of longitude becomes smaller toward the poles.

2. Standard Time

The differences in time between places. — If you were to travel from New York to San Francisco, you would find on arriving there that your watch was three hours too fast. The reason is that the rotation of the earth is from west to east. The sun is, on the meridian on the Atlantic coast, about three hours earlier than on the Pacific coast. Hence, when it is noon in New York, it is only about nine o'clock in the morning at San Francisco. The time steadily changes in going either east or west, so that no two places on an east-west line have exactly the same time by the sun. Formerly every city used its own sun time, or *local time*. This was a source of great trouble to travelers; for their watches were always wrong when they arrived at new places.

How trouble caused by these differences is now largely avoided. — In order to avoid this trouble, our continent has been divided into belts, throughout each of which the same time is used. Since this time is the standard for all, these belts are called *Standard Time Belts*. The belt which includes the Northeastern States, all but a small area of the Southern States bordering the Atlantic, and half of Ohio, is called the *Eastern Time Belt*. What are the others called (Fig. 233)?

In traveling across the country from New York City to San Francisco, one starts with his watch set at the standard time for the Eastern Time Belt. At length he comes to a place where the time is changed one full hour; then he sets his watch back one hour to *Central Time*. Going still farther west to

the *Mountain Belt*, he again sets his watch back an hour. What does he do when he reaches the *Pacific Belt?* By this arrangement, the same time is used over a very broad belt, and only a few changes of the watch have to be made. State how a watch would have to be changed when one goes eastward from San Francisco to New York.

How the time for each belt is fixed. — Our study of longitude helps us to understand what determines the places for changing this time. The earth makes one complete rotation every 24 hours, so that 360 degrees pass directly beneath the sun in the course of a day of 24 hours. Dividing 360 by 24 gives 15; that is the number of meridians, one degree apart, that the sun appears to pass over in a single hour. Therefore, when it is noon in a place on the 75th meridian, as at Philadelphia (Fig. 233), it is eleven o'clock just 15° west of this, or on the 90th meridian. When it is noon at one point on a meridian, it is noon all along that meridian.

This explains what has determined the boundary lines of the time belts. The time selected for the Eastern Belt is that of the 75th meridian; for the Central Belt, that of the 90th meridian, which the sun reaches one hour later. What meridian is selected for the Mountain Belt (Fig. 233)? For the Pacific Belt?

Each of these meridians runs through the *middle* of the belt whose time it fixes. Thus, the eastern boundary of the Central Time Belt is halfway between the 75th and 90th meridians, that is, 82½° W. Long.; and the western boundary is halfway between the 90th and 105th meridians, or 97½° W. Long. As a matter of fact, the boundaries of the time belts do not fall *exactly* on these meridians. It often happens that the meridians chosen for boundaries pass through very unimportant points, or even cross the railways far out in the open country. Instead of following the meridians closely, therefore, the boundaries of the time belts often pass through well-known cities. For instance, Toledo, Columbus, and Atlanta lie on the boundary between the Eastern and the Central Time Belts.

Except along the exact center line of these time belts, standard time, of course, does not agree with local or sun time. Such disagreements, however, between standard and local time do not cause serious inconvenience when large areas agree to adopt the same kind of time. For this reason, it has been found easy in many parts of the world during recent years to use what is called *daylight-saving time* throughout the lighter half of the year. Since people ordinarily rise at an hour which is much closer to noon than the hour when they retire, daylight-saving time, by shifting the clock an hour ahead, enables entire communities to live according to their usual schedule as shown by the clock and yet to waste one less hour of daylight each morning. What can you tell regarding the arguments for and against daylight-saving time? What is the relation between daylight saving and conservation of fuel?

Facts to be especially well fixed. — 1. The meaning of latitude. 2. Of longitude. 3. The method by which places can be located accurately by a statement of their latitude and longitude. 4. The reasons for adopting standard time. 5. Explanation of the irregular boundaries of the standard-time zones.

Problems for independent study. — 1. Find how the streets of Washington have been numbered and lettered. 2. What is the latitude and longitude of Boston? Of Washington? Of Chicago? Of your home? 3. Find some cities that are on or

near the 42d parallel of latitude. 4. What place is in 25° N. Lat. and 81° W. Long.? What place is near 40° N. Lat. and 75° W. Long.? 5. Find places that have nearly the same latitude as your home. 6. Show on a globe, or map, where a ship would be when in zero latitude and zero longitude. 7. Examine a globe to see what meridian is a continuation of zero longitude on the other side of the earth. 8. Find the latitude of the tropic of Cancer; of the tropic of Capricorn; of the Arctic circle; of the Antarctic circle. 9. What is the latitude and longitude of the point on the earth exactly opposite your home; *i.e.* if you could pass directly through the earth, where would you come out on the other side? Show by a globe the error of the common idea that "the other side of the world" is China. 10. Examine some railway time-tables to see how they indicate the changes in time. 11. What is the difference, where you live, between standard time and solar or sun time?

III. Winds and Rainfall

1. Winds

The problem before us. — In our study of North America, we have learned that the winds of different sections come from different directions. For example, in the West Indies, Central America, and southern Mexico, the winds blow from a generally easterly direction; but on the western side of the continent, all the way from California to Alaska, the wind blows quite as regularly from the west. In the eastern part of the United States, on the other hand, the winds are irregular in direction, although they blow more often from the west than from any other quarter. We shall now study the causes for these differences.

The movements of air caused by a hot stove. — It will help us to understand this subject if we first find what currents of air a hot stove causes in a room. The first thing that happens when a fire is kindled is that the air near the stove is warmed. First the warm air near the stove expands and becomes lighter. Then the cooler, heavier air in other parts of the room settles down and flows in toward the stove, forcing upward the warm, light air near it. This warm, rising air grows cooler as it comes in contact with the cool ceiling and the walls of the room. This makes it dense and heavy again; it then settles toward the floor at some distance from the stove, and once more moves toward it. In other words, the air keeps circulating in the room, rising when warmed and settling when cooled.

How the principal winds of the earth resemble these currents. — On the earth the broad torrid zone, which is warmed by the sun's rays, takes the place of the stove. The air above the heated surface of the earth in the torrid zone expands and becomes lighter, just as the air does above the stove. The cooler, heavier air to the north and south of the torrid zone then flows in and pushes the light air up and away. Such a flowing of the air is what we call *wind*.

This movement of the air is illustrated in Fig. 241. The letter **E** stands for the equator. The arrows represent the cooler air, north and south of the equator, as crowding in toward that section, then rising, and returning once more to the north and south.

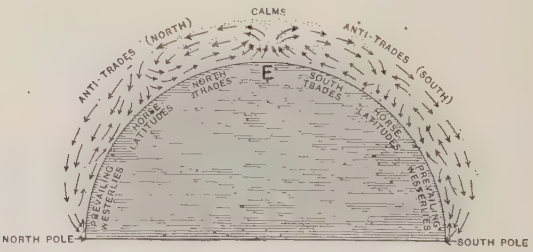

Fig. 241. — Diagram to show the movement of the greater winds of the earth

The trade winds and the anti-trades. — The air that flows toward the equator causes very regular winds called *trade winds*. These start both north and south of the equator, hundreds of miles away, and blow toward it day after day and month after month.

Their causes

The heated air is pushed up to a great height, and then flows back in the same direction from which it came. This forms the *return trade*, or *anti-trade winds* (Fig. 241). The atmosphere extends many miles above the earth, so that there is plenty of room for two winds, one above the other, blowing in different directions. Being cooled on account of expansion as it is forced upward, the air of the anti-trades slowly settles, some of it coming to the surface at about a third of the distance to the poles. There it spreads out, part continuing on toward the poles, and part returning to the equator as the trade winds. Point out the arrows that show these movements in Fig. 241.

If the earth stood still, the trade winds would blow directly toward the equator from the north and south; and the anti-trades would blow directly away from it. As you know, however, the earth rotates from west to east. This causes the trade winds to be turned from their straight course toward the equator. Those in the northern hemisphere are turned to the *right*, so that they blow from the *northeast* instead of from the north. Those in the southern hemisphere are turned toward the *left*, and therefore blow from the *southeast* instead of from the south.

Effects of the earth's rotation on the direction of these winds

The anti-trades are also turned toward the right in the northern hemisphere, where they blow from the southwest, and toward the left in the southern hemisphere, where they blow from the northwest.

Location of the great wind belts. — It is now easy to see why the West Indies, Central America, and southern Mexico receive such regular winds from the northeast. They lie in the belt of the northeast trade winds just described.

In the United States, Canada, Europe, and a part of Asia, the winds blow so often from the west, northwest, or southwest, that these lands are known as the belt of *prevailing westerlies*.

Regular winds, such as are found in North America, are likewise found in most other parts of the world. There are several *belts* of regular winds extending around the earth. Point out in Fig. 242 the belt of *trade winds* north of the equator. Point out the *prevailing westerlies*. Point out the two similar wind belts south of the equator.

The belts of calms and of light and variable winds. — Besides the four belts of winds just mentioned, there are three other belts in which light, variable winds alternate with periods of calm. The most important of these is called the *equatorial belt of calms* (Figs. 243–244), which is several hundred miles in width. This belt is situated where the trade winds from the northeast and those from the southeast die out. It is in this belt that the heated air in the torrid zone is rising. Since it is moving mostly *upward*, little wind can be felt, and this is, therefore, a belt of prevailing calms. What winds there are, are usually light and changeable.

Northern Mexico and southern California are situated in another belt of light winds with frequent calms. This is a belt where the air of the anti-trades is *settling* toward the earth; and settling air, like rising air, does not cause winds. This region is known as the *horse latitudes*. Find it on Figs. 243–244. Show the corresponding belt on the

Fig. 242

south side of the equator. (Figs. 243 and 244.)

Effects of the earth's revolution on these belts. — The belt of most intense heat is not always in exactly the same part of the earth. In June, when the sun is vertical at the Tropic of Cancer, the belt of greatest heat lies north of the equator; and in December, when the sun's rays are vertical at the Tropic of Capricorn, it lies farther south. As the belt of greatest heat thus shifts with the seasons, the wind belts and the belt of calms move also. (Figs. 243 and 244.)

2. Rainfall

Relations of winds to rain. — Knowing the wind belts that encircle the earth, we have a key to the principal rain belts, for the winds are the water carriers of the earth. Water that is evaporated from the surface of the oceans and of the lands is borne along in the air in

the form of vapor. It descends to the earth as rain or snow, falling in great abundance in some places, and scarcely at all in others.

Principal cause of rain. — To understand the cause for the change of vapor to rain or snow, it is necessary, first of all, to know that warm air can contain much more

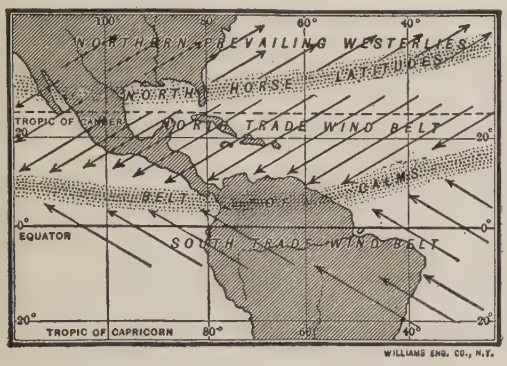

Fig. 243

Diagram to show the position of the trade winds belts and the equatorial belt of calms in summer.

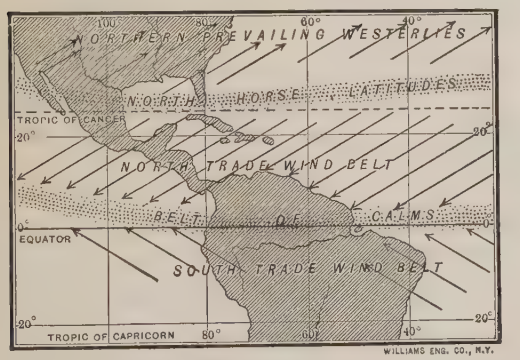

Fig. 244

Diagram to show the position of the trade winds belts and the equatorial belt of calms in winter.

vapor than cold air. For this reason, whenever air is cooled sufficiently, some of the water vapor which it bears is condensed. For example, dew forms on grass when the air near the ground grows cool in the evening. In a like manner, the vapor in our breath is condensed, thus forming a little cloud, when we breathe into the cold air of a winter day. Rain and snow are also caused by the cooling of air which contains vapor.

One important cause of the cooling of air is that it expands on rising above the surface. Perhaps you have noticed how cool the air feels as it rushes out from an automobile tire when you open the valve. The coolness is due to the expansion of the air as it comes out. In a similar way, when air rises above the surface of the earth, it expands, because there is less air above to press upon it. Then it grows cool, and some of its vapor is condensed to form clouds and raindrops.

This is the chief reason why winds from the ocean cause rainfall on mountain slopes and plateaus. The air is forced to rise in order to pass over the highlands, and that causes it to expand and grow cool. For the same reason, air that rises in the warm parts of the earth, like the equatorial belt of calms, also gives up vapor to form rain. Briefly, — *when air is forced to rise, it expands and cools; and then rain usually follows.*

One reason for dry weather. — On the other hand, air that is settling grows warmer; this, instead of giving up its vapor, becomes dry and clear. Since there can be more vapor in warm than in cool air, such settling air currents become drier. They cause clouds to disappear, and water to be evaporated from the ground. This is the reason why the horse latitudes are arid belts; for, as you remember, the air in these belts is settling from above. Briefly, — *when air descends, it grows warmer; then the sky is clear and the weather dry.*

Location of the regular rain belts. — These facts are well illustrated in the rainfall of North America. The northeast trade winds, having gathered a large amount of vapor from the ocean, deposit it on the windward or eastern slopes of the West Indies, southern Mexico, and Central America (Fig. 242). The western

In North America

slopes of the West Indies, however, receive a much smaller quantity of rain; and the western coast of Mexico is arid. Farther north the prevailing westerlies, having traveled a long distance over the Pacific Ocean, likewise cause heavy rains along the western coast of North America (Figs. 13 and 242). But these winds also lose much of their moisture in passing over the Western Cordillera; the land farther east, therefore, receives much less rain from this source. Northern Mexico and the southwestern part of the United States, lying within the horse latitudes, where the air is descending, also receive very little rain (Fig. 242).

Other regions that lie within the regular wind belts show the same conditions of rainfall. For example, note what heavy rains the northeast trade winds bring to northern South America and to southeastern Asia.

In other regions north and south of the equator

In western Asia and northern Africa, on the other hand, these winds deposit little moisture. They have been blowing a long distance over land, rather than over water, and have little vapor to deposit. They are, moreover, moving from a cooler to a warmer region, and are taking up more moisture. They are, therefore, *drying winds*. This accounts for the Sahara and certain other deserts.

The *prevailing westerlies* reach Europe, as well as North America, and cause abundant rainfall on the western coast. The three peninsulas of southern Europe, however, lie partly within the horse latitudes; and for this reason they receive little rain, especially in their southern portion.

By a careful study of Fig. 242, show how the rainfall south of the equator can be explained. Note whether the prevailing winds for each region that you study have been blowing over land or water; whether they are blowing toward a cooler or a warmer region; and whether they are forced to rise over mountain ranges.

The equatorial belt of calms is the most rainy of all the belts, because its hot, moisture-laden air is rising and cooling. After a clear night in that region, the sun usually rises in a cloudless sky. As the morning advances, and the heat grows more intense, the damp air rises more rapidly; then small clouds appear, which grow steadily until rain falls. Showers occur almost every day, increasing in the afternoon. When the sun sets, and less air rises, the clouds melt away, and the night is as clear as before. Our hot summer days, with heavy thunder showers in the afternoon and evening, illustrate the weather that is repeated, day after day, in this belt of calms.

In the equatorial belt of calms

You have already learned (p. 234) that the wind belts shift northward in summer and southward in winter. Many regions in the torrid zone are within the belt of calms during the summer months, and are swept by the trade winds in the winter months. In such places the year is thus divided into two seasons: (1) a wet season, when the region is in the belt of calms; and (2) a dry season, when the trade winds blow. Among the areas thus affected are North and South America from California (p. 131) southward to Argentina, central Africa, southern Asia, and the northern part of Australia. See Figs. 245 and 246.

Shifting of these rain belts

In the horse-latitude belts there are also wet and dry seasons, but the wet season comes in the winter owing to the shifting of the westerlies toward the equator in that season. Areas of winter rains are found in

southern California, in the Mediterranean lands, central Chile, and parts of southern Australia and South Africa.

Regions of irregular rains. — Thus far only the *regular* wind and rain belts have been considered. From what has been said, one might expect that the west winds, so dry after passing over the highlands of the western part of the United States, would continue eastward and cause our North Central and Northeastern States to be arid. As a matter of fact, abundant rain falls in this section, as shown by Fig. 18. We know, too, that both winds and temperature are quite changeable over this entire area. The reason for such changeable weather here is that this region is crossed by great storms, moving roughly from west to east. When such storms begin in the Northwest, there is a large area there with lighter air than that over the surrounding region. Such an area is called a *low-pressure area*, or a *low* (Fig. 247). The heavier air from the surrounding country flows toward this low-pressure area from all directions.

In eastern United States and Canada

1. The changeable weather here

The air that flows in is forced upward near the center of the low-pressure area. As it rises, the vapor condenses, forming clouds and rain, as in the belt of calms. Such an area of low pressure, with its clouds and rain, is known as a *cyclonic storm area*. Instead of remaining in one place, the cyclonic storms travel eastward, being carried along by the prevailing westerlies; indeed, they appear to be whirls, or *eddies*, in the prevailing westerlies, somewhat like the eddies in the current of a stream.

2. The movement of the cyclonic storms, and their extent

These storms bring most of the rain that falls in the United States and Canada east of the Rocky Mountains. The area upon which rain may be falling from the clouds of one of the cyclonic storms is sometimes very great. Indeed, places fully a thousand miles apart sometimes receive rain at the same time, from the same storm. As the storm moves eastward, the weather begins to clear and to grow colder in its western side (Fig. 249).

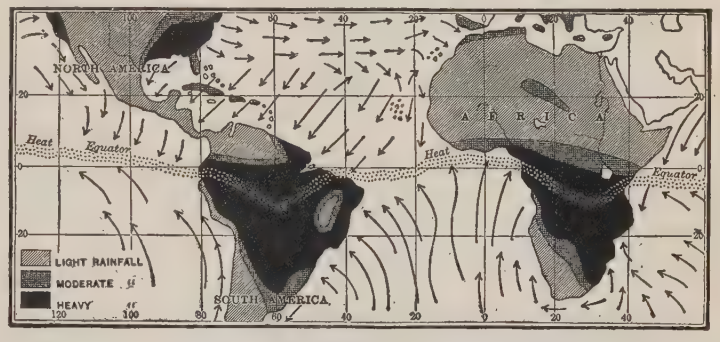

Fig. 245. — Winds and rainfall in South America and Africa from December to February

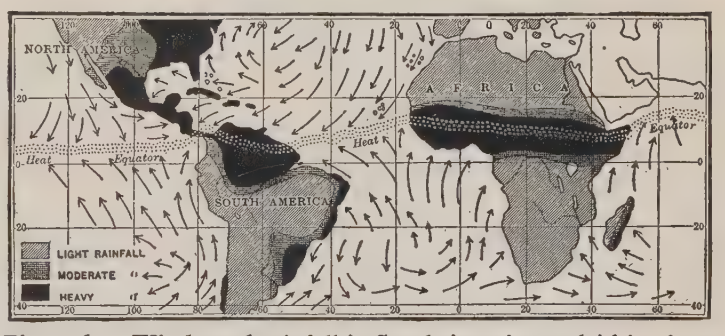

Fig. 246. — Winds and rainfall in South America and Africa from June to August

Compare with Figs. 243 and 244 to see how the belts of heavy rain have moved as the wind belts have shifted with the change of season.

The vapor that causes the rain in these storms is brought from the Gulf of Mexico and the Atlantic Ocean, being carried by the winds for hundreds of miles, even into Canada.

Not only are rains brought by these storms, but also changes in temperature and in the speed and direction of the winds. Warm winds, blowing from the south toward the low-pressure areas, are the cause of the winter thaws and the summer hot spells which are common in the East and Middle West. It is chiefly during the hot spells that thunderstorms occur; also, in some places, *tornadoes*, often misnamed *cyclones*, in which the winds blow so fiercely that houses are torn to pieces.

3. Their effects on the weather

After a low-pressure area has passed eastward and the storm is over, the wind generally blows from the west. This causes cool, dry weather in summer and cold weather in winter. The severe drops in temperature that often occur are called *cold waves;* these, sweeping over the East and even into the South, often do great damage to fruit trees and delicate plants.

By watching the pressure of the air, as shown by instruments called *barometers*, it is possible to predict cyclonic storms; and since they always move toward the east, it is possible, by further study of the barometer and of the winds, to predict their course somewhat accurately, and thus to warn people of their approach.

4. Possibility of predicting these storms

This work is so important that the government employs a large force of men, stationed in different parts of the country, to observe the pressure of air, direction of wind, etc. A special branch of the Department of Agriculture, called the *Weather Bureau*, is in charge of this work. The observations are made at the same time at all stations, and telegraphed to a central office at Washington. The weather observations and predictions are then telegraphed to all parts of the country, so that one knows what kind of weather to expect a full day before it comes. Maps, called *weather maps*, are also sent out from the more important

5. How the predictions are made and how people are warned

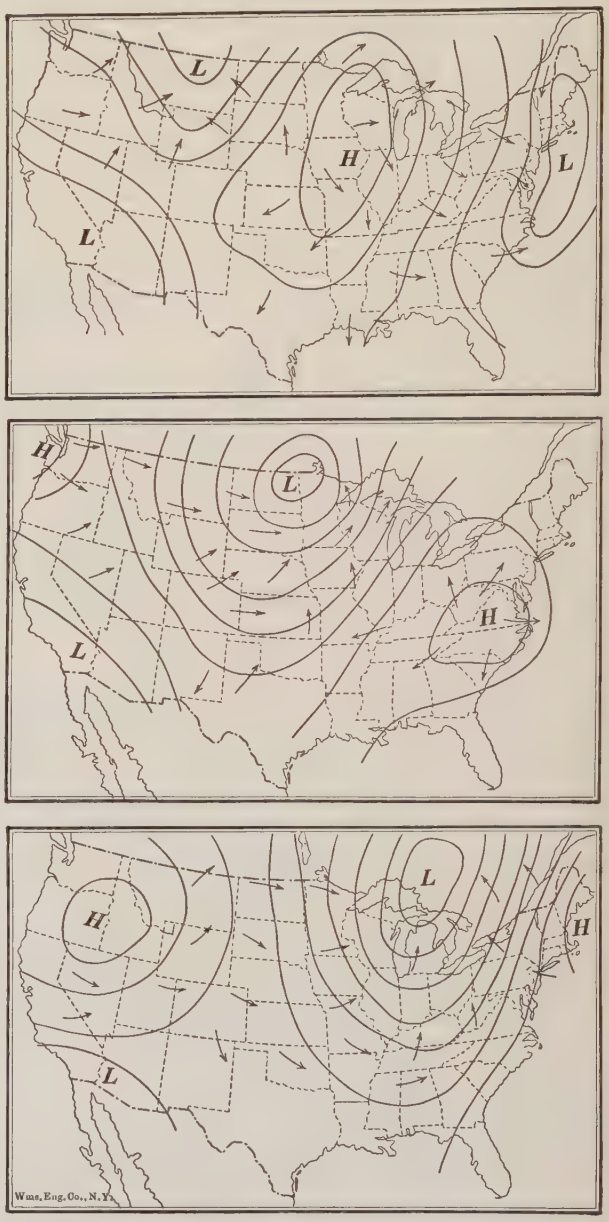

Fig. 247.—"Highs" and "Lows" in the United States on three successive days

Weather Bureau stations. Fig. 247 is made from such maps. It shows the eastward progress of an area of low pressure

by indicating its position on three successive days.

By the predictions of the Weather Bureau, farmers and gardeners are warned against damaging frosts, and sailors against severe storms. Hundreds of thousands of dollars and many lives are saved in this manner every year. Especially valuable service has been rendered by the Weather Bureau in predicting the fierce *hurricanes* that start in the West Indies and sometimes do great damage there, as well as on our own southern and eastern coasts.

Other regions of irregular rains in Europe

Since Europe, like the United States, is mainly in the belt of prevailing westerlies, it also is visited by cyclonic storms. Many of the storms that cross our country pass over the ocean and travel far into Europe and Asia, where their effects are similar to those in North America. Cyclonic storms develop also in the belt of prevailing westerlies in the southern hemisphere. For this reason the weather of southern South America and Australia resembles our own. Why cannot the same statement be made regarding the southern part of Africa? Examine the map to see.

Monsoons. — There are other causes besides cyclonic storms of interference with the regular winds of the earth, and therefore with the rainfall. One of these is the difference in temperature between land and water. When a large body of land, like a continent, becomes heated during the summer season, air from the cooler ocean tends to blow toward it for hundreds of miles. In winter, on the other hand, when the land becomes cooler than the ocean, the cold air over a vast area tends to move toward the sea. Such winds exist in Mexico and our Gulf States; but winds which thus blow in opposite directions in different seasons, are better developed in India than in any other part of the earth. It was here that they received the name *monsoon winds*. The name *monsoon* is now given to this class of winds wherever they may blow.

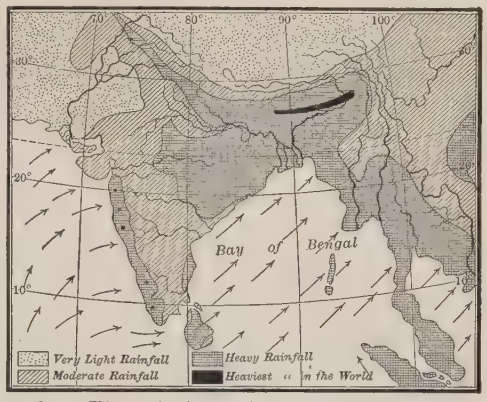

Fig. 248. — The winds and rainfall during the summer monsoon of India

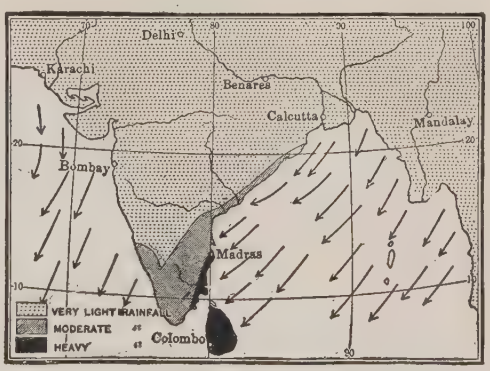

Fig. 249. — The winds and rainfall during the winter monsoon of India

Compare with Fig. 248, and notice how very light the rainfall is in one season, and how heavy it is in the opposite season.

The interior of Asia is so far from the ocean that there are naturally great changes in temperature from summer to winter. During the winter the heavy air over the cold land settles down as drying air, and presses outward beneath the warmer air that lies over the ocean. This produces dry winds from the land (Fig. 247). In summer, on the other hand, the air over the

cool water crowds in, raises the heated air of the continent, and produces ocean winds and rain (Fig. 248). The rainfall is especially heavy where the moisture-laden air ascends the steep slope of the Himalayas. Indeed, the region north of the Bay of Bengal receives a heavier rainfall than any other part of the earth (Fig. 401). The winter monsoon, on the other hand, is so dry that vegetation withers and the soil becomes parched and cracked.

Facts to be especially well fixed. — 1. The explanation of the trade winds. 2. Of the chief belts of calms. 3. The explanation of the seasonal shifting of wind belts. 4. The chief reasons for changes in the direction of winds in the belts of westerlies. 5. Location of the chief rain belts. 6. The movement of cyclonic storms, and their effect upon the rainfall of the United States.

Problems for independent study. — 1. Estimate the number of barrels of water that falls on an acre of ground, or upon a city block, in one year, where the rainfall is forty inches. 2. How is a movement of air secured in your schoolroom in order to ventilate it? 3. Watch the higher clouds to see in what direction they are moving. 4. Write an account of the changes in weather for five days in succession: the wind direction and force; the clouds; rain or snow; temperature; and, if possible, the air pressure.

IV. Distribution of Temperature

Why places in the same latitude may have different temperatures. — As a rule, the farther north one travels from the equator, the colder it grows; but this is by no means always the case. There are several causes which interfere with this regular decrease in temperature toward the poles.

The presence of highlands is one cause. It is a well-known fact that high mountains have a cold climate, even though in the torrid zone; for the same reason, plateaus may be colder than lowlands farther north.

A second cause is the fact that land warms and cools much more rapidly than water (p. 239). For this reason it becomes warmer than the ocean in summer, and colder in winter. Thus Minnesota has a *continental* climate (p. 64), with great extremes of heat and cold.

The winds are a third factor which greatly influence temperature. Where the prevailing winds are from the ocean, they cause an equable climate, as along the western coast of North America from California to Alaska (p. 232). Where they blow from the land, on the other hand, they are cool or cold in winter, and warm or hot in summer.

A fourth cause for such difference in temperature is found in the ocean currents (p. 243).

The temperature regions of the earth. — Now that we have studied the factors that influence temperature, we shall not be surprised to learn that the boundaries of the temperature regions of the earth are exceedingly irregular. Recall what you have already learned regarding the temperature regions of North America (p. 13). There are similar temperature regions in the other continents. The position of these will be studied in connection with each continent. Latitude has a greater effect upon temperature than any other one factor; consequently the temperature belts, like the zones, may be expected to extend around the earth in an east and west direction. This is in general the case. Some temperature regions, however, extend north and south, as do those along the eastern shores of the oceans. The reasons for the chief irregularities in the shape and area of these regions will be discussed in connection with each continent.

Their irregularity

Perhaps you may wonder, in your study of the maps of the temperature regions, how

their boundaries have been determined. Just what temperatures shall we call *hot*, and what *cold?* Some convenient temperatures are chosen by scientists who have made a study of climate. Thus it is agreed that regions be called *always cold* if the average temperature of no month in the year is above 50° Fahrenheit. In a similar way, a region where the average temperature of no winter month is below 50° may be called a region of *mild winters;* and one where the average of no summer month is higher than 68° is called a region of *mild summers*. Thus *mild* means *without extremes of temperature*, whether of heat or of cold. Regions whose average temperature in no month of the year falls below 68° are referred to as *always hot.*

How the boundaries of these regions have been determined

Maps showing such regions, of course, since they show only hot regions, cold regions, etc., cannot show just how hot the hot regions are or how cold the cold ones are. Yet the distinctions shown on these maps are the really important ones because the temperatures which have been chosen are those that affect agriculture and hence human life. Thus in every region marked *always cold* the growing season (if there is any such season) is too short for the maturing of crops. On the other hand, in the regions marked *always hot* the growing season, so far as the influence of temperature is concerned, is twelve months long, though in some hot regions, of course, a dry season interferes with the continuous growth of crops. Between the regions too cold for profitable farming and the tropics, both in the northern and in the southern hemisphere, the length of the growing season varies according to the distance from the equator, the altitude, and the nearness of large bodies of water. In the region of *extreme summers and mild winters* it varies from seven to ten or more months. It is shorter than this in the region of *extreme winters and mild summers*, — so short, in fact, as to make agriculture difficult in the northern half of this region.

Relation between temperature regions and agriculture

Facts to be especially well fixed. — 1. The four most important factors that determine temperature. 2. How the boundaries of the temperature regions have been determined. 3. The connection between length of growing season and the temperature regions.

Problems for independent study. — 1. By comparing Figs. 12, 290, and 398, determine which of the temperature regions of the northern hemisphere appear to encircle that hemisphere completely. 2. Using Figs. 254, 457, and 468 in the same manner, solve the same problem with reference to the southern hemisphere. 3. What appear to be the most pronounced cases, on each of the six maps just referred to, of temperature regions that are little influenced by latitude?

V. Ocean Currents

The winds which blow over the ocean cause the water over which they blow to move in the same direction. This starts a current, or drift, of surface water. Where the winds blow steadily, as in the trade wind belts, there is a permanent drift of water in the direction of the prevailing winds. In this way a great system of ocean currents is formed (Fig. 250). These have an important influence on the temperature of the earth.

Main cause of ocean currents

In the eastern part of the Atlantic, where the trade winds blow, the surface water on the two sides of the equator drifts slowly in the direction of the trade winds; that is, toward the equatorial belt of calms (Fig. 242). The water then moves westward, as a great *Equatorial Drift*, until it reaches the coast of South America, which interferes with its

Causes of the North Atlantic Eddy

course. There the drift of water is divided, a part being turned southward, while the greater portion proceeds toward the northwest.

The part that flows northwest turns toward the right; and the part that flows into the South Atlantic turns to the left. The northern drift keeps turning to the right, and therefore, instead of continuing along the American coast, swings out into the Atlantic toward Europe. Continuing to turn, it then passes southward, and finally returns to the trade wind belt, where it started, having made a complete circuit. This circular drift of water in the North Atlantic is called the *North Atlantic Eddy*. Coming from the equatorial region, the water in this huge eddy is warm.

A portion of the drift of water which moves toward the northwest along the northern coast of South America enters the Caribbean Sea and then passes into the Gulf of Mexico. This forms a broad, deep, gently flowing current through these inclosed seas, which are so nearly surrounded by warm, tropical lands that the water grows even warmer than it was before.

Course of the Gulf Stream

After swirling slowly round the Gulf of Mexico, the water escapes between Cuba and Florida. The current then becomes known as the *Gulf Stream* because it comes from the Gulf of Mexico. It soon leaves the American coast, however, and flows northeast toward northern Europe. It broadens rapidly and mingles with the western part of the great North Atlantic Eddy. In crossing the Atlantic, this combined current, or drift, is pushed along by the prevailing westerlies, so that it reaches the shores of northern

Fig. 250. — The principal ocean currents of the world

Europe and even enters the Arctic Ocean. In this part of its course the current is called the *West Wind Drift.* Some idea of its volume may be gained from the fact that it carries many times as much water as all the rivers of the world together.

Some of this water returns in a cold current, called the *Labrador Current,* which flows southward along the northeastern coast of North America. Starting from among the islands of northern North America, it flows past the coast of Labrador, Newfoundland, Nova Scotia, and New England as far as Cape Cod. Like all ocean currents in the northern hemisphere, it is turned toward the right; that is, since it flows southward, toward the west. This causes it to follow our coast very closely, keeping nearer our shore than does the Gulf Stream. This current explains why an east wind in New England is likely to be chilly.

Course of the Labrador Current, and some of its effects

Where the cold and warm currents approach each other, dense fogs are common. The reason for this is that warm, humid winds from the Gulf Stream are chilled in crossing the Labrador Current. This causes some of the vapor to condense and form fog particles. The region near the coast of Nova Scotia and Newfoundland is one of the foggiest in the world, and therefore dangerous to vessels.

In the Pacific Ocean, as in the Atlantic, the water is driven before the trade winds. Thus a broad drift is formed, moving westward in the belt of calms. Then a warm current swings to the right past Japan, crossing the ocean toward Alaska. This is called the *Japanese Current.* Continuing to turn to the right, this ocean drift passes southward to complete the vast eddy. There is also a cold current from the north, between the Japanese Current and the coast of Asia, corresponding to the Labrador Current in the Atlantic, though smaller and not so cold.

Similarity of currents in the North Pacific

From what has been said, we see that the *northeastern* coasts of both North America and Asia are swept by ocean currents from the cold north. On the other hand, the *northwestern* coasts of Europe and North America are approached by warm drifts of water from the south. What effects would you expect these currents to have on the land regions near which they pass? In answering this question, remember the direction of the prevailing winds.

In the South Atlantic, South Pacific, and Indian oceans, there are eddies similar to those of the North Atlantic and the North Pacific. There is one very important difference, however. In the southern hemisphere the currents turn to the *left* instead of to the right. Some of the water of these eddies joins the broad *West Wind Drift* of the distant southern ocean; but much of it turns northward until it once more reaches the trade wind belt, thus completing the eddies.

Eddies of the southern oceans

The effects of ocean currents upon human life are many and various. They influence the temperature of land regions leeward from them, largely because they warm or cool the winds that sweep over them. For this reason, currents in the belts of prevailing westerlies exert much more influence over lands to the east of them than they do over lands to the west of them. Although it was formerly supposed that the cold currents which sweep down along the northeastern coasts of North America and Asia were in large measure respon-

Effects of ocean currents

sible for the cold temperatures that prevail in these regions, it is now believed that their cooling effect is confined to the brief periods during which the winds blow from off the sea. On the other hand, northwestern Europe and the western coast of North America all the way from Alaska to California are greatly moderated by the prevailing west winds which here blow over wide expanses of comparatively warm water. We have already studied this effect in detail in the case of North America (pp. 16 and 184). For the effect upon Europe, see p. 284.

Facts to be especially well fixed. — 1. The chief causes of ocean currents. 2. The courses of the most important currents in the North Atlantic and the North Pacific oceans. 3. The effects of the most important ocean currents upon climate.

Problems for independent study. — 1. What course might a vessel take in order to be carried from Europe to America and back again by ocean currents? 2. How do vessels avoid running into one another in dense fogs? 3. What would be some of the effects upon the climate of the northern hemisphere if the position of the cold and warm currents were interchanged? If the currents remained as they are, but the direction of the prevailing winds were reversed?

PART III. SOUTH AMERICA

	Form of Government	Area in Square Miles	Population	Largest City	Population
Argentina	Republic	1,153,000	8,279,000	Buenos Aires	1,637,000
Bolivia	Republic	514,000	2,890,000	La Paz	100,000
Brazil	Republic	3,276,000	30,492,000	Rio de Janeiro	1,128,000
British Guiana	British colony	89,500	311,000	Georgetown	54,000
Chile	Republic	290,000	3,946,000	Santiago	416,000
Colombia	Republic	441,000	5,420,000	Bogota	138,000
Dutch Guiana	Dutch colony	46,000	108,000	Paramaribo	37,000
Ecuador	Republic	116,000	2,000,000	Guayaquil	94,000
Falkland Islands	British colony	6,500	3,300	Stanley	1,000
French Guiana	French colony	32,000	26,000	Cayenne	14,000
Paraguay	Republic	65,000	1,000,000	Asuncion	102,000
Peru	Republic	722,000	4,500,000	Lima	144,000
Uruguay	Republic	72,000	1,430,000	Montevideo	361,000
Venezuela	Republic	399,000	2,225,000	Caracas	87,000
South America		7,222,000	62,630,300		

Questions. — 1. How many of these countries are larger in area than Texas, our largest state? 2. How many are more populous than New York, our most populous state? 3. Determine from this table, by arithmetic, which South American country has the densest population. 4. Which country contains nearly half the population of South America?

I. General Facts

Area, and distribution of population. — While the area of South America is more than two thirds that of North America, its population is less than one half as great. Compare their areas and populations as given in the tables on this page and on p. 13.

The distribution of the population of South America is perhaps still more uneven than that of North America. There are two points of difference that are especially striking. In the interior of the continent, where the rainfall and vegetation, as shown in Figs. 255 and 256, are abundant, there are very few inhabitants. The Amazon Basin has not, thus far, attracted settlers to any such extent as has the Mississippi Basin. Notice in Fig. 256 how much of the continent is still forested. Again, the principal population in many sections is found some distance inland rather than on the coast. Point out some of the countries in which this is the case. The coast of tropical South America has had far less attraction for settlers than has the coast of our continent.

Questions on Fig. 251. — 1. How does the area of lowland compare with that in North America (Fig. 1)? 2. How do the two continents compare in regularity of coast line? 3. What effect would you expect this to have upon commerce? 4. How does South America compare with North America in the number of large lakes?

SOUTH AMERICA
PHYSICAL MAP
Scale of statute miles
0 100 200 400 600 800 1000
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
Sea level to 1000
DEPTHS IN FEET
Sea level to 5000
Below 5000
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
CENTRAL AMERICA
LESSER ANTILLES
GUADELOUPE I.
DOMINICA I.
MARTINIQUE I.
SANTA LUCIA I.
BARBADOS I.
TRINIDAD I.
CURAÇAO I.
Gulf of Venezuela
Pt. Gallinas
Gulf of Darien
Lake Maracaibo
Delta of the Orinoco River
ISTHMUS OF PANAMA
Gulf of Panama
Magdalena R.
Cauca R.
Vol. Tolima 18,432 ft.
Guaviare R.
Orinoco R.
LLANOS
GUIANA HIGHLANDS
SIERRA PACARAIMA
SIERRA PARIMA
Casiquiare R.
TUMAC-HUMAC MTS.
Uaupes R.
Jary R.
Mouths of the Amazon River
MARAJO
Para R.
Equator
Vol. Cotopaxi 19,613 ft.
Vol. Antisana 18,858 ft.
Vol. Chimborazo 20,498 ft.
Gulf of Guayaquil
C. Blanco
Parina Pt.
Yapura R.
Rio Negro
Napo R.
Putumayo R.
Amazon R.
Marañon R.
Ucayali R.
Huallaga R.
Jurua R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Madeira Falls
Mt. Huascaran 22,188 ft.
Andes Mts.
Selvas
Campos
Araguaya R.
Tocantins R.
Parnahyba R.
Cape St. Roque
C. Blanco
Guapore R.
Mamore R.
Mt. Sorata 21,490 ft.
Lake Titicaca
Mt. Illimani 21,190 ft.
Sahama Vol. 21,047 ft.
PLATEAU OF BOLIVIA
PLATEAU OF MATTO GROSSO
Xarayes Swamp
SERRA DO ESPINHAÇO
SERRA AMBOTY
São Francisco R.
Rio Grande
SERRA DA MANTIQUEIRA
SERRA DO MAR
Cape Frio
Tropic of Capricorn
Atacama Desert
Pilcomayo R.
Paraguay R.
Paraná R.
Iguassu Falls
BRAZILIAN HIGHLANDS
SERRA GERAL
ST. FELIX I.
ST. AMBROSE I.
Copiapo Vol. 16,067 ft.
Salinas Grandes
Salado R.
Mt. Aconcagua 22,860 ft.
Uspallata Pass
JUAN FERNANDEZ ISLANDS
Pampas
Plata R.
C. San Antonio
Colorado R.
C. Corrientes
Rio Negro
Blanca Bay
San Matias Gulf
CHILOE I.
CHONOS ARCHIPELAGO
Gulf of St. George
Gulf of Penas
PLATEAU OF PATAGONIA
WELLINGTON IS.
QUEEN ADELAIDE ARCHIPELAGO
Strait of Magellan
FALKLAND ISLANDS
TIERRA DEL FUEGO
Cape Horn
SOUTH GEORGIA I.
SANDWICH ISLANDS
WILLIAMS ENGRAVING CO. N.Y.
Longitude West from Greenwich

Fig. 251

SOUTH AMERICA
POLITICAL MAP
Scale of statute miles
0 100 200 400 600 800 1000
Capitals of Countries ⊙
Railroads
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
CENTRAL AMERICA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
GUADELOUPE (Fr.)
DOMINICA (Br.)
MARTINIQUE (Fr.)
SANTA LUCIA (Br.)
BARBADOS (Br.)
TRINIDAD (Br.)
Port of Spain
Caracas
Maracaibo
Puerto Cabello
Delta of the Orinoco River
Georgetown
New Amsterdam
Paramaribo
St. Laurent
Cayenne
Bogota
Medellin
Cali
Buenaventura
Barranquilla
Cartagena
Panama Canal
Gulf of Panama
Gulf of Darien
Quito
Vol. Antisana
Vol. Cotopaxi
Vol. Chimborazo
Guayaquil
Gulf of Guayaquil
Cuenca
Iquitos
Amazon R.
Rio Negro
Manaos
Obidos
Santarem
Mouths of the Amazon River
Para (Belem)
Maranhao (Sao Luiz)
Granja
Ceara
Cape St Roque
Natal
Parahiba
Pernambuco (Recife)
Joazeiro
Maceio
Bahia
Cerro de Pasco
Lima
Oroya
Callao
Cuzco
Arequipa
Titicaca L.
Mollendo
La Paz
Mt. Illimani
Mt. Sorata
Cochabamba
Oruro
Sucre
Potosi
Matto Grosso
Plateau of Matto Grosso
Goyaz
Diamantina
Porto Seguero
Caravellas
Victoria
Petropolis
Sao Paulo
Cape Frio
Nictheroy
Rio de Janeiro
Santos
Iquique
Arica
Antofagasta
Tropic of Capricorn
Salta
Asuncion
Tucuman
Corrientes
Santiago del Estero
Rio Grande
Parana R.
Uruguay R.
Porto Alegre
Montevideo
Plata R.
C. San Antonio
C. Corrientes
Bahia Blanca
Blanca Bay
Rio Negro
Puerto San Antonio
Mendoza
Mt. Aconcagua
Valparaiso
Santiago
S. Fernando
Talca
Concepcion
Valdivia
Chillan
Cordoba
Santa Fe
San Luis
Rosario
Buenos Aires
La Plata
Salto
JUAN FERNANDEZ IS. (To Chile)
CHILOE I.
CHONOS ARCHIPELAGO
Gulf of Penas
Castro
QUEEN ADELAIDE ARCHIPELAGO
Strait of Magellan
Punta Arenas
TIERRA DEL FUEGO
Cape Horn
FALKLAND ISLANDS (British)
SOUTH GEORGIA I. (British)
SANDWICH IS. (British)
Equator
Tropic of Capricorn
Longitude West from Greenwich
WILLIAMS ENGRAVING CO. N.Y.

Fig. 252

Questions on Fig. 252. — 1. Judging from the number of railroads, which would you expect to be the leading countries of South America? 2. Which countries suffer the greatest handicaps to foreign commerce? 3. By comparison with Figs. 12 and 13, decide which countries enjoy the greatest variety of temperature and rainfall.

How can we account for the smaller population of South America, and for the distribution of its inhabitants?

Disadvantages for development that South America has suffered. — The location of a continent has much to do with its importance. If it lies in a portion of the earth that is always hot, for example, its people do not have the same energy as those in more temperate regions. The weather does not permit it. Nor are they likely to be as free from disease, because the higher temperature and greater moisture favor the greater development of disease germs. The wet, hot tropics have always been the backward regions of the earth. South America suffers greatly because of its climate. In Fig. 254 note about how much of the continent lies in the belt where it is *always hot.*

The disadvantages due to its location

The difficulty of reaching South America has been another hindrance to its development. The great nations of the earth are almost entirely in regions where there are distinct winters. Show that this is true. If their people go to South America, they must cross the hot, moist belt, or at least a large part of it. Travel is more comfortable

The difficulty of transportation to and from it

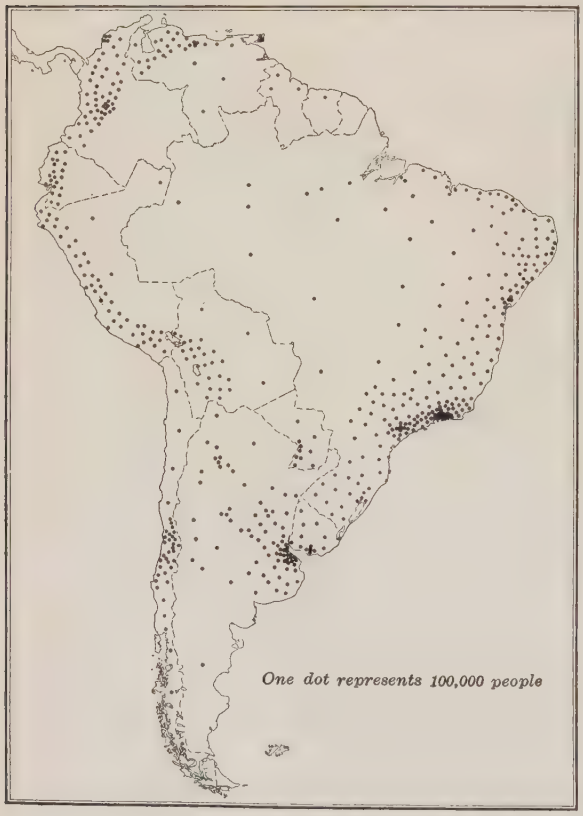

Fig. 253. — Distribution of population in South America

Fig. 254. — The temperature regions of South America

and convenient where such great changes in temperature are not encountered. If they ship freight, the added expense and inconvenience may be much greater. For example, in the damp climate of tropical South America iron and steel goods are likely to rust rapidly, leather goods to mold, wooden furniture to swell, and foods to spoil. Special precautions must be taken against such dangers on the way.

The landing, too, may be difficult, for there are few natural harbors and few harbor improvements. At many points vessels must be met some distance from shore by *lighters*, and both freight and passengers must be transferred from one to the other. Partly on this account, it is far easier to ship goods from New York to Europe than to South American ports that are no more remote. All nations, in order to progress, must have foreign commerce, especially if they do not produce both raw products and manufactured goods. The difficulty of carrying on foreign commerce has hindered the development of South America and made it less attractive to home-seekers than North America.

Transportation within the continent is also difficult. The Andes Mountains are a great

After Gannett and Office of Farm Management, U. S. Dept. of Agric.

Fig. 255. — Annual rainfall in South America

Compare this map with Fig. 256 to see the explanation of the different types of vegetation. By reference to Fig. 242, see how many of the regions of heavy and of very light rainfall you can account for. Is there a larger or smaller area of heavy rainfall than in North America (Fig. 13)?

After Schimper, modified and simplified

Broad Leaved Temperate Forests.
Now being removed to prepare land for tillage.
Grasslands — Llanos in Venezuela. Savannas in Brazil, Pampas in Argentina.
Pampas mostly tilled. Good grazing lands.
Semi-desert, Scrub Woodlands, and Cold Treeless Regions
Barren deserts shown thus
Tropical Forests — Very little tillage. Suitable for plantation agriculture.
Collecting of gums, medicinal plants, nuts, and some lumbering.
Alpine vegetation.
Some grazing.

Fig. 256. — The plant regions of South America

BRAZIL AND THE GUIANAS
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 100 200 300 400 500
Capitals of countries
Railroads
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
Sea level to 1000
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
VENEZUELA
COLOMBIA
GUIANA
(BRITISH)
(DUTCH)
(FRENCH)
BRAZIL
PERU
BOLIVIA
PARAGUAY
ARGENTINA
URUGUAY
CHILE
La Guaira
Caracas
Valencia
Barquisimeto
Lake Maracaibo
Port of Spain
Delta of the Orinoco River
Orinoco R.
Ciudad Bolivar
Georgetown
New Amsterdam
Paramaribo
St. Laurent
Cayenne
Equator
Mouths of the Amazon River
Rio Negro
Manaos
Amazon R.
Para (Belem)
Marajo Island
Maranhao (Sao Luiz)
Camocim
Ceara (Fortaleza)
Caxias
Therezina
Iguatu
Pernambuco (Recife)
Joazeiro
Bahia (Sao Salvador)
All Saints Bay
Tocoda Onca
Ilheas
Porto Velho
Madeira Falls
Guajara Mirim
Guapore R.
Matto Grosso
Bananal Island
PLATEAU OF MATTO GROSSO
Goyaz
Pirapora
Paraopeba
Ipameri
Diamantina
Caravellas
Figuera
Sao Pedro
Xarayes Swamp
Corumba
Sucre
Arica
Iquique
Antofagasta
Tropic of Capricorn
Salta
Taltal
Caldera
Tucuman
Puno
Lake Titicaca
La Paz
Mt. Sorata 21,490 ft.
Mt. Illimani 21,190 ft.
Itapura
Rio Preto
Barretos
Victoria
Porto Tibirica
Jupia
Indiana
Mt. Itatiaya 8898 ft.
Petropolis
Cape Frio
Nictheroy
Rio de Janeiro
Sao Paulo
Santos
Asuncion
Villa Rica
Iguassu Falls
Serrinha
Antonina
Paranagua
Rio Negro
Sao Francisco
Col. Ijuhy
Cruz Alta
Uruguayana
Santa Maria
Porto Alegre
Lagoa dos Patos
Pelotas
Rio Grande do Sul
Jaguarao
L. Mirim
Salto
Cordoba
Santa Fe
Rosario
Buenos Aires
Montevideo
Mt. Aconcagua 22,800 ft.
Mendoza
Valparaiso
Santiago
Coquimbo
Longitude West from Greenwich
R. C. Brelle, N.Y.
WILLIAMS ENGRAVING CO., N.Y.

Fig. 257

Questions on Fig. 257. — 1. Show how the position and surface features of the Guianas make it advisable to group them with Brazil rather than with Venezuela. 2. By comparison with Fig. 253, see how the districts of densest population correspond with those of greatest railroad mileage. 3. Why do you suppose there is a railroad from Guajara Mirim to Porto Velho?

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hindrance to the construction of highways and railroads. Our Southern Pacific Railroad crosses the Sierra Nevada at an altitude of about 7,000 feet. On account of the much greater height of the Andes, and the fact that these mountains form the boundary between separate nations, it is not likely that transcontinental lines will ever be numerous or pay as well in South America as in North America.

The difficulty of transportation within the continent

Again, both railroads and wagon roads are especially difficult to keep in repair. Snowslides and avalanches are a constant source of difficulty in the mountains; the heavy rainfall in the tropical lowlands causes dangerous washouts, and the moisture and heat together produce in these regions such rank vegetation that a neglected road soon becomes covered up and lost. In Fig. 252 note how few railroads have been built. The entire mileage in South America is only about 50,000, while that in North America is nearly 325,000.

Nor have the rivers been by any means as valuable for transportation as those in North America. Only one of them has any considerable population along its course. Which one is it? Name the other principal rivers, and state what you observe about the population near them (Fig. 253).

Lack of coal is still another handicap. Want of good harbors, railroads, and wagon roads would cripple manufacturing in any region. When coal is lacking, too, the prospects for the development of industry are especially poor. There are, to be sure, small deposits of coal; but until more of it is discovered in widely distributed places, manufacturing cannot flourish. There is therefore little work of the kind that awaits immigrants to North America. In fact, North America is nearer Europe, the great source of home-seekers, and on that account will continue to attract new settlers until it becomes too densely populated to offer a good livelihood.

Lack of coal

South America was first settled by the Spaniards and Portuguese. During the last 300 years these nations have not kept pace with those of northwestern Europe and North America in industrial progress. Their methods of agriculture, manufacturing, and transportation have been backward, and the education of the masses has in some of these countries received little attention. They transplanted their manners and customs to the New World, and were slow to change them.

Slowness of people to adopt new ways

When America was discovered, Spain was the most powerful country in Europe, and expected the lion's share of the New World. At the same time Portugal was prominent, and sent out many explorers. Some of these laid claim to the eastern coast of South America. In order to prevent trouble between the two nations, the Pope declared that all territory east of a certain line, which was near the 40th meridian, should belong to Portugal, and all west of it to Spain. The line was later pushed westward to the sixtieth meridian, but it was at least partly owing to this declaration by the Pope that Brazil became Portuguese, while the greater part of the continent fell to Spain.

1. Source of early European settlers

The only portion colonized by other nations is that called Guiana, which is now divided among the British, Dutch, and French. Each of these three European countries got possession of some of the islands to the north (Fig. 215), and later came to hold part of the mainland near by as a colony. Spanish is still the common language for most of the continent, while Portuguese is confined to Brazil.

In most of the countries the whites are far outnumbered by Indians and people of mixed blood. One reason for this is that not so many Europeans have emigrated to South America as to North America. No doubt its location in the tropics and difficulties of transportation have helped to keep them away. In recent years, however, large numbers of Germans and Italians have settled in the temperate portion of the continent.

2. The small number of whites compared with the number of other inhabitants

The character of the early Indians is another reason for the smaller number of whites. The Indians that were first encountered by European settlers in North America were in the hunting and fishing stage of development. They were not used to a fixed home and steady work. On that account they could not make profitable slaves. On the extensive uplands of South America, however, the Indians had advanced farther; they were accustomed to agriculture and mining, — in other words, to hard labor. For that reason it was easier to compel them to work for others. Accordingly, instead of being driven out or killed off, they were enslaved by the whites. Their numbers steadily increased, and when slavery was abolished they became the greater part of the free people in such districts.

While the three Guianas are colonies, all the other countries of South America are republics. A great majority of the people, however, in several of the countries of South America can neither read nor write. They are therefore too ignorant to take an active share in the government. It is plain, therefore, that such countries are not republics as we understand that term; the real work of government is done by a few leaders, who may or may not be progressive.

3. Lack of responsibility in government

II. Tropical South America

1. Brazil and the Guianas

Possibility of the Amazon Basin helping to feed the world. — The United States has always produced most of its own food and sent large quantities abroad. If its population increases as rapidly in the future as it has in the past, the time will soon come when it will have little to spare; in fact, when it cannot raise enough for home use. What are we to do then? And where are the nations of Europe to look for their food supply? Heretofore the Mississippi Basin has been a source of food for North America and Europe. Can the Amazon Basin become a new source, perhaps far surpassing that of the Mississippi in agricultural products?

Seriousness of the question

Few persons realize the extent of this region; it has about twice the area of the Mississippi Basin. Moreover, the conditions most favorable to plant growth, — namely, heat, moisture, and fertility of soil — are found here in the highest degree so that the luxuriance of its vegetation far surpasses that of the Mississippi Basin.

Superiority of the Amazon Basin over the Mississippi Basin for vegetation

That does not necessarily mean that plants grow larger here than elsewhere, or live

longer; for the very abundance of vegetation checks the growth of any one kind, and decay is especially rapid in such a climate. The giant trees of California are far larger and older than any known in the Amazon Valley. Nor can all plants be grown to advantage. Apple and peach trees and many others of our fruits do not mature there; neither do our most important grains, such, for example, as corn and wheat. They thrive in the hardier climate of the temperate zones.

The greater luxuriance of vegetation means greater rapidity, quantity, and variety of growth on a given area. Many kinds of fruits flourish there, only a few of which are familiar to us, such as bananas and pineapples; many varieties of vegetables flourish there; also rice, sugar cane, cacao, and dozens of other foods that are strange to us now, but which we could learn to eat, just as we have recently learned to eat bananas (p. 202). The Amazon far surpasses the Mississippi Basin in the variety of its vegetation.

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Fig. 258. — A dugout canoe on one of the branches of the Amazon River, Peru

The density of the tropical forests makes land travel difficult in the Selvas (Fig. 251). Travel is almost entirely by boat. Small ocean steamers may ascend the Amazon to Iquitos. River steamboats are used above Iquitos and on many of the tributaries. Dugouts like the one in the picture are common all along the Amazon.

There is one great difficulty, however, in the way of extensive production: the white man cannot thrive there. The mouth of the Amazon is at the equator, and in all that vast basin the sun's rays are always nearly vertical. This fact compels him to avoid heavy work and to remain in the shade most of the day.

The chief difficulty in the way of greater production

The dampness makes the heat even more oppressive. At Para it rains from one to five hours nearly every day; and when it rains in the tropics, it pours. For the explanation of such tropical rains, see p. 236. In such a hot, humid climate the white man is not merely uncomfortable; his health is impaired. His blood becomes thin, and he is subject to fever and other tropical diseases.

The effects of this difficulty are seen in both the numbers and the occupations of the inhabitants. The largest city in the Amazon Basin is Para, with 275,000 inhabitants. The next is Manaos, 1,000 miles up the river, with 81,000; and the third is Iquitos, 1,600 miles still farther up, with about 15,000. Locate these. Name the three largest cities in the Mississippi Basin and give their populations. Fig. 253 shows that the whole Amazon Basin has only

Effects of this difficulty

1. On the density of population

two or three million inhabitants, while the Mississippi, with only about half the area and less productiveness, has between forty-five and fifty million.

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Fig. 259. — A rubber tree in the Amazon Basin

In this picture we see how the latex, or rubber milk, is collected in small cups hung beneath cuts in the bark. The rubber trees are widely scattered through the tropical forest. The latex is collected and carried to a central point, where it is dried down to a gummy mass ready for transportation to Para or other river ports.

2. On the leadership of the rubber industry

Although vegetation is so luxuriant, and the conditions for plant growth are very favorable, there is little farming. The one great industry has for many years been the collection and transportation of rubber. For a long time Brazil produced more than half the world's supply. Although it produces at the present time about the same amount as formerly, its output is only a small part of the total world production each year, because its production of rubber is now exceeded by that of other tropical countries which formerly produced little or none (p. 428).

The trees whose latex produces the rubber do not grow in groves, but are scattered through the dense forests all the way from the mouth to the source of the Amazon and over a large part of its basin. There are many species of trees whose latex can be hardened into rubber, but from only one of these is much collected in the Amazon Valley. The natives are employed to tap the trees, collect, and evaporate the latex so as to get the solid rubber, and take it to warehouses along the larger streams. From these it is shipped down the river to Iquitos, Manaos, and Para.

During the busy season the rubber workers usually live alone in little huts in the woods and follow paths from tree to tree. Their number is suggested by the fact that when the wet season prevents work in the forest, Iquitos, the smallest of the three rubber centers, has a population of about 30,000 instead of 15,000, the usual number. The pro-

duction of rubber in scattered areas is practically the only occupation throughout this vast area.

Possible solutions of the difficulty

There seem to be only two possible ways of making the Amazon Basin highly productive. One is to establish plantation farming on a large scale, under the control of white men. The natives alone cannot be depended upon to develop the region; but they will work under the direction of white men. White men, therefore, who can stand the climate for at least a few years must be relied upon to establish large estates employing hundreds of men. They have already planted many rubber trees on the lower Amazon, and have established some promising cacao and sugar plantations there. They could supply the money and intelligence that are necessary, while avoiding the heavy physical labor, which would be done by natives under the guidance of carefully chosen overseers. Tractors and other labor-saving machinery could be introduced. If such measures for sanitation were taken as have proved so valuable in the Panama Canal Zone and in Cuba, including means for securing pure drinking water and for destroying insect pests, white men might find the life more bearable. This plan shuts out the immigrant with little or no capital; but it may be the means of solving the problem.

The other possible solution is to encourage the immigration of Chinese or Japanese or Hindus. These peoples have shown remarkable energy and intelligence in independent farming and gardening in some of our own states, and can stand the hot climate better than white men.

The most important part of Brazil, and its attractions. — The most important part of Brazil at present is the southeastern coast and the highland back of it, the area extending from the boundary of Uruguay northeast to Pernambuco.

Its location and climate

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Fig. 260. — A coffee plantation in Brazil

In the background are the coffee trees from which the coffee is picked. In the foreground are the drying flats where the coffee is dried in the sun. Some plantations employ hundreds of workers.

Estimate this distance. What do you observe about the density of population in this section (Fig. 253)?

While most of it is in the tropics, there are two means of relief from the heat. The southeast trade winds blow very regularly against this coast (Fig. 242), reducing its temperature. Back of the narrow coastal plain there is also a vast plateau whose altitude of 2,000 to 3,000 feet affords considerable relief for that area. Name several cities located directly on the coast.

The leading industry is the raising of

coffee. Brazil grows approximatly two thirds of all the coffee in the world. The center of the industry is Sao Paulo. Many of the coffee plantations are as large as some of our counties, and the owners take great pride in handing down such large estates undivided from father to son. Do you consider such a practice a good or a bad thing for the country?

The leading industry, and cities dependent upon it

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Fig. 261. — Coffee warehouses at Santos

The coffee plantations sometimes employ more than 1,000 men, who are engaged in cultivating, pruning, spraying, and, finally, in harvesting the crop. The trees produce berries, each of which contains two coffee beans surrounded by pulp. The berries are first picked and dried, after which the beans are removed and dried still further. One tree may produce as many as four or five pounds of coffee, but most trees yield from one to three pounds. It is packed into bags for shipment, Santos being the principal city for its export. A large quantity, however, is shipped from Rio de Janeiro. The importance of its coffee shipments and its unusually fine harbor have helped to make Rio de Janeiro the leading city of Brazil and to justify its selection as the national capital.

The area northeast of the coffee region produces tropical and semi-tropical crops. The most prominent are sugar cane, cotton, and cacao. The leading cities are Bahia and Pernambuco. Locate them.

Other occupations north and west of Rio de Janeiro

Mining and grazing are carried on to some extent in the interior in the highlands. These industries may become of great importance in the near future. That time can hardly come, however, until many more railroads are built. Why?

Promise of the most recently settled portion. — Brazil extends a long way southwest of the coffee region into the temperate zone. Estimate the length of coast lying within that belt. The southern half of this area is in many respects the most promising part of Brazil. To what part of the United States does this section correspond in its temperatures (Figs. 12 and 254)? Many thousands of Germans, Austrians, and Russians have recently settled here (p. 258), dividing the land into small farms, building good roads, establishing schools, and introducing many of the conveniences to which they were accustomed in their native countries. It is an extremely prosperous region and is in many ways the most attractive part of Brazil.

Its location and development

This new settlement strengthens Brazil in one very important way. The two leading industries of the nation are the production of rubber and of coffee. The rubber trees, however, are in danger of destruction, owing to the great demand for their latex and the care-

The peculiar advantage it secures to Brazil

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Fig. 262. — A portion of the city and harbor of Rio de Janeiro

Rio, the name by which the city is commonly known, is the second city in South America in size and has one of the largest and most beautiful harbors in the world. The harbor is seventeen miles long and fifteen miles wide. The entrance is less than a mile wide and lies between mountains the most striking of which is Sugar Loaf, the cone-shaped mountain in the middle background of the picture.

less methods used in gathering it. We have already seen (p. 254) that Brazil is no longer the chief rubber-producing country of the world. It is quite possible that this industry, for the reasons just given, may not only continue to shrink in importance when compared with the output of other regions, but actually diminish in Brazil.

Again, the coffee plantations grow little besides coffee; they represent the one-crop kind of farming, just as our Southern States once did (p. 111). They are liable to suffer, too, in the same way. If the coffee trees were ever seriously damaged — as might happen — great suffering would result. Thus Brazil's dependence on rubber and coffee as her main products renders her prosperity insecure.

The newly developed section in the south helps to meet this danger. Both semi-tropical and temperate crops thrive here. Name a few of each kind. Grazing is also extensively developed. If rubber and coffee decline in importance, this region can do a great deal to preserve the prosperity of the nation.

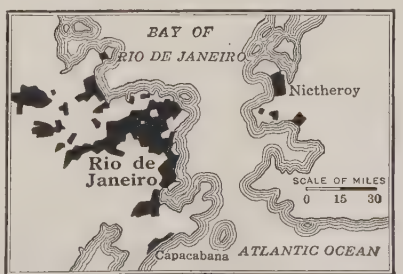

Fig. 263. — Rio de Janeiro and vicinity

The danger it brought during the World War

This section has been a source of danger as well as a protection. The settlers, as we have seen, are mainly Germans and

Austrians. German has been the language in many of the schools and in ordinary business. Laborers who could not speak German have found it difficult to get employment. When the World War began, many of the settlers opposed any measures that were unfavorable to Germany; indeed, they were suspected of planning to become a German colony. The poor connection with other parts of Brazil favored such a break. One railway runs from this section to the coffee region (Fig. 257); but the only way of reaching Bahia, or Pernambuco, or Para, is by the sea. About how far is it to each of these cities? The great importance of railways as an aid in the proper government of a country is well illustrated in this case.

The Brazilian government, however, had sufficient strength, energy, and courage to hold this movement in check; not only that, but to declare war against Germany at the same time. Brazil is the only country of South America that actually entered the war.

The undeveloped condition of the Guianas. — The slight importance of the Guianas is suggested by the fact that they have a total population of less than a half million, although they have been settled for 300 years. The most important of the three divisions is British Guiana; but even here the interior has been little explored; and the low coast land is too hot and humid for Europeans. The chief industry is agriculture; the leading exports are sugar and rice. In the interior highlands, especially in British and French Guiana, there are important deposits of minerals, which, like those of Argentina (p. 275), have not yet been extensively mined. British Guiana, moreover, like Tennessee (p. 119), has immense deposits of bauxite, the ore from which aluminum is made.

2. The Northern Andean Countries

(Venezuela, Colombia, Ecuador, Peru, and Bolivia)

Our special interest in these countries. — Two of these countries, Venezuela and Colombia, border the Caribbean Sea for a long distance. For about how many miles?

Why we have had a special interest in Colombia and Venezuela

Since the completion of the Panama Canal, we have an added interest in that sea and the countries surrounding it; for unfriendly relations with the latter might endanger our possessions. Recall any steps that we have taken to protect them.

Certain difficulties have brought us into especially close relations with these two countries. When we obtained the Canal Zone from Panama, we aroused the distrust of the Colombians. Only a short time before, Panama had been a part of Colombia, and the Colombians believed that we had encouraged her in her revolt from the mother country in order that we might the more easily secure control of the isthmus. The fact is, however, that the people of Panama had long been dissatisfied with the government of Colombia, and had frequently attempted revolution.

Our government has gone to the aid of Venezuela on two important occasions. One was a long-standing dispute between that country and England concerning the western boundary of British Guiana. The other concerned the payment of debts that she owed to several European nations. In both cases the United States was of great aid in bringing about a settlement. These close relations have interested us particularly in the character of these peoples and in their prosperity.

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Fig. 264. — A portion of Caracas, Venezuela

Caracas is located 3,000 feet above sea level in a valley in the Andes. The temperatures at Caracas are moderate throughout the year. The city is quite modern; many of the principal streets are paved, and there are telephone and telegraph systems and street railways.

Our new interest in the Pacific coast countries

The Canal has brought our more densely populated states so much closer to the Pacific coast countries that we have a new interest in them. Before the Canal was opened they could be reached from New York only by sailing around South America, a voyage that was both difficult and dangerous. The passage through the Strait of Magellan is very winding, with dangerous rocks, heavy mists that shut out the view, and strong winds and ocean currents that drive vessels out of their course. The route around Cape Horn is still longer, though not so dangerous.

With the Canal, however, these difficulties are avoided, and the distance is greatly reduced. How much nearer is Guayaquil to New York by way of the Panama Canal than around Cape Horn (Fig. 495)? By being nearer our neighbors than formerly, we gain an important advantage over Europe. Estimate on the same map the distance from Guayaquil to Liverpool. We can expect, therefore, to visit and trade with these nations much more extensively in the future.

Our need to trade with them, also, has increased. Since we are likely to import large quantities of food in the near future, and to require new markets for our increasing manufactures, we shall want to buy from these nations, and sell to them, on a large scale.

NORTHERN ANDEAN COUNTRIES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300 350
Capitals of countries ⊙
Railroads
HEIGHTS IN FEET
Over 10,000
1000 to 2000
5000 to 10,000
Sea level to 1000
2000 to 5000
WILLIAMS ENGRAVING CO., N.Y.
Longitude West from Greenwich
CARIBBEAN SEA
PACIFIC OCEAN
ATLANTIC OCEAN
PANAMA
COLOMBIA
VENEZUELA
ECUADOR
PERU
BRAZIL
BOLIVIA
CHILE
PARAGUAY
ARGENTINA
GUIANA HIGHLANDS
BRITISH GUIANA
Selvas
PLATEAU OF BOLIVIA
Gran Chaco
Pt. Gallinas
Curacao I. (Dutch)
Gulf of Venezuela
Puerto Cabello
La Victoria
La Guaira
Trinidad I. (Br.)
Port of Spain
Santa Marta
Puerto Colombia
Barranquilla
Cartagena
Maracaibo
Lake Maracaibo
Valencia
Caracas
Barquisimeto
Cumana
Barcelona
Delta of the Orinoco River
Colon
Isthmus of Panama
Panama
Gulf of Darien
Gulf of Panama
Cucuta
Merida
San Cristobal
Bucaramanga
Orinoco R.
Ciudad Bolivar
Georgetown
Medellin
Manizales
Bogota
Vol. Tolima 18,432 ft.
Western Cordilleras
Central Cordilleras
Eastern Cordilleras
Cauca R.
Magdalena R.
Apure R.
Llanos
Guaviare R.
Buenaventura
Cali
Serra Pacaraima
Serra Parima
Cuiuni R.
Caura R.
Equator
Quito
Vol. Cotopaxi 19,613 ft.
Vol. Antisana 18,885 ft.
Latacunga
Ambato
Vol. Chimborazo 20,498 ft.
Riobamba
Guayaquil
Gulf of Guayaquil
C. Blanco
Cuenca
Loja
Yapura R.
Putumayo R.
Napo R.
Boundary in dispute
Rio Negro
Manaos
Amazon R.
Iquitos
Parina Pt.
Puerto Limon
Maranon R.
Paita
Chiclayo
Trujillo
Huallaga R.
Ucayali R.
Javari R.
Jurua R.
Purus R.
Madeira R.
Tvdoro R.
Porto Velho
Mt. Huascaran 22,188 ft.
Huaraz
Madeira Falls
Villa Bella
Guajara Mirim
Riberalta
Cerro de Pasco
Oroya
Callao
Lima
Guapore R.
Beni R.
Mamore R.
Cuzco
Pisco
Ica
Reyes
Trinidad
Matto Grosso
Mt. Sorata 21,490 ft.
Puno
Lake Titicaca 12,508 ft.
Arequipa
Vol. Misti 19,200 ft.
La Paz
Mt. Illimani 21,190 ft.
Mollendo
Cochabamba
San Jose
Oruro
Sahama Vol. 21,047 ft.
Lake Aullagas
Arica
Sucre
Pisagua
Potosi
Iquique
Tupiza
Tarija
Pilcomayo R.

Fig. 265

Questions on Fig. 265. — 1. What natural feature is common to Venezuela, Colombia, Ecuador, Peru, and Bolivia? 2. How many mountain peaks, named on this map, are higher than any in North America (Fig. 1)? 3. Which of these countries has the greatest railroad mileage? 4. Where on this map do two great river systems join? Arrows are used to show the direction of the flow of water here.

Prospect of their meeting our hopes in regard to trade. — Any nation must be reasonably prosperous to buy or sell extensively. How prosperous, then, are these countries? And what is their prospect for growth?

They are as unfavorably located in latitude as the Amazon Basin. Note where the equator crosses Ecuador; yet owing to their altitude they largely escape the extreme heat of the Amazon Basin. Along most of the coast from eastern Venezuela to southern Peru there is a low plain varying from a few miles to several hundred in width. The temperature there is high. But in most sections one soon begins to ascend on going inland, and a large part of these countries is a plateau varying from 9,000 to 14,000 feet in altitude. In Fig. 265 note the area over 10,000 feet. Several of the mountain peaks, as noted above, are higher than any in North America.

How they largely escape the handicap of the Amazon Basin

On account of the high altitude the temperatures on this plateau are similar to those of Mexico City (Figs. 12 and 254). Even though the sun is so nearly overhead (Fig. 236), there is perpetual spring, a most delightful climate. On that account most of the inhabitants, particularly the whites, live on the highlands (Fig. 253).

The snow line is about 16,000 feet, or more than three miles, above sea level. This is a very great altitude; and the variety of temperature conditions below such an elevation permits a great variety of vegetable products, unless the rainfall is insufficient. In the lower Orinoco Valley the luxuriant grass makes cattle raising profitable; indeed, grazing here is capable of development on a far larger scale than the present.

Their variety of climate

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Fig. 266. — A cattle ranch in Colombia

High up in the Andes above the forest region there are many thousands of square miles of good pasture land. How do the temperatures here compare with those on the lowlands?

Tropical products are raised in the valley of the Magdalena River in Colombia, along the coastal plains of Colombia and Ecuador, and on the lower eastern slopes of the Andes in Peru and Bolivia in regions where the rainfall is heavy. See Fig. 256 for the distribution of tropical forests; Fig. 255 furnishes the

Their agricultural products

explanation. Chief among these products are sugar, bananas, and rice. The region about Guayaquil is famous for its cacao. For many years about half of all the cacao in the world was grown in this locality, but its production here has greatly declined in recent years.

Ascending 2,000 or 3,000 feet, one finds coffee growing on the slopes, and there is considerable cotton and tobacco. Higher still, potatoes, barley, wheat, corn, garden vegetables, and other crops of the temperate zone flourish. The broadest plateaus are those in Bolivia, where grasslands support great numbers of sheep, alpacas, llamas, and vicunas, all of them valuable for their wool.

In some portions of these countries the rainfall is insufficient for agriculture except by irrigation. For example, the coastal plain of Venezuela is generally dry because the northeast trade winds that blow over it do not precipitate their moisture until they begin the ascent of the mountain slopes southwest of this region. Western Peru and Bolivia are also dry (Fig. 255), for this region is on the lee side of mountain ranges in the belt of southeast trade winds. On the irrigated lands of western Peru, near the coast, cotton, rice, and sugar cane are grown. The high plateau lands in Bolivia are so cool that temperate-zone products are raised wherever irrigation is practiced.

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Fig. 267. — Copper smelters at Oroya, Peru

This city, at the end of the state railway, is high up in the Andes, in the rich mineral region of Peru. Locate it on Fig. 265. Gold, silver, mercury, lead, zinc, and many other ores are found in this region. Some of the silver and gold mines have been worked for many hundreds of years.

Their forest and mineral products

The types of trees vary also with the altitude. On the well-watered lowlands are dense forests containing many kinds of dyewoods and cabinet woods. The rubber tree is common here also. Iquitos, one of the centers for rubber (p. 254), is in northeastern Peru. Other products are quinine, vanilla, and sarsaparilla. High up on the slopes of the Andes are such trees as are common in temperate latitudes.

It was the precious metals that first attracted the Spaniards to the Andean countries, and mining has been important ever since. Gold and silver are found in many places; there is copper in Peru and tin in Bolivia, besides a great number of other minerals, including small deposits of coal. The heavy tropical rains are a valuable aid to mining, for they cut away the soil and rock and thus expose the mineral veins to the prospector.

There are, however, two serious obstacles to trade with us. One is the character of the people. A large proportion of the inhabitants are Indians and persons of mixed blood. Recall some of the reasons for this.

Two serious obstacles to trade

1. Character of the people

So small a number of whites means that the standards of living are low. Even the cities, such as Quito, for example, present a poor appearance, the streets being generally narrow and unpaved, and most of the buildings unattractive. In the country, conditions are even less comfortable. The houses are usually barren huts with dirt floors; clothing is ragged and soiled; and agricultural and mining implements are of the crudest sort.

The perpetual spring, that is to us so delightful, is perhaps partly to blame, for such weather easily undermines one's energy. The great altitude is, perhaps, another reason for this lack of ambition. At an elevation of 10,000 feet one unaccustomed to high altitudes cannot run or play games as we can at sea level; one's breath comes short and exhaustion soon follows. Whatever the cause, it is a fact that most of the people in these countries move about slowly and do little work.

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Fig. 268. — A part of the main business street in Barranquilla, Colombia

Locate this city on Fig. 265. Why does it have a large trade with the interior of Colombia? Tell how one may reach Bogota from this city. In what language is the sign in the picture?

The other obstacle to extensive trade with these countries is their lack of transportation facilities. Since the mass of the people live at least one or two miles above sea level, goods sent to them from abroad must be carried a long distance uphill; and goods sent abroad by them must be transported just as far downhill. Owing to these facts, the chief cities have grown up in pairs: one on the coast to receive and ship out products; and the other on the highlands to distribute goods received and to collect the products of the country for export. It is interesting to locate these twin cities and to notice the railroads that usually connect them.

2. Difficulties of transportation

a. Dependence of the many pairs of cities upon each other

In Venezuela they are La Guaira and Caracas. Find them on the map (Fig. 265). In Colombia they are Barranquilla and Puerto Colombia, near the mouth of the Magdalena, and Bogota, far inland. Estimate the distance between these coast cities and Bogota. The river and railways together connect the two; but transportation between them is so poor that goods have to be transshipped at least half a dozen times on the way. In Ecuador Guayaquil is the port, and Quito, 165 miles distant, is the

inland city. In Peru the most important port is Callao, connected by rail with Lima, the capital. Mollenda is the leading coast town in southern Peru, the shipping point for goods to and from Arequipa. Since Bolivia has no seacoast, it must depend upon the neighboring countries for ports. What are some of its chief cities, and, as shown by the railroads, what ports does it use? Most of the harbors of these coast towns are very poor (p. 249), and the towns themselves are unsanitary. Guayaquil was long known as a pest hole (see p. 266); and La Guaira's reputation is hardly better.

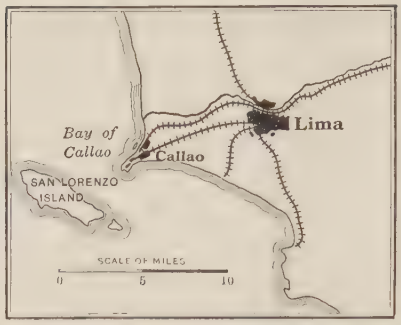

Fig. 269. — Lima and Callao

The construction of these railroads and transportation upon them are necessarily very expensive. Why? Delays, also, are frequent, on account of washouts and avalanches. Yet these countries are almost entirely dependent upon these few ports for outlet. Bolivia, however, has a natural route for the commerce of the eastern lowland by way of the Madeira River. Trace this on Fig. 265. What obstruction is there on the river

b. Small railroad mileage

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Fig. 270. — La Paz and Mt. Illimani, Bolivia

La Paz lies in a deep valley on the eastern slopes of the Andes more than 12,000 feet above the sea. At this great altitude the summers are short and cool. The picture shows how barren the slopes of the valley and the mountains are. What is the rainfall of this portion of Bolivia? La Paz was founded more than fifty years before the settlement of Jamestown. Its inhabitants have always depended largely upon mining for a living.

and how is it overcome? How far is Guajara Mirim from the Atlantic Ocean (Fig. 265)?

In the entire distance along the coast from eastern Venezuela to southern Peru there are hardly more than a dozen railroads that lead up on to the plateau. How many can you count in Fig. 265? How many miles long do you estimate this coast line to be? How far apart, then, are these railroads, on the average?

c. Difficulties of transportation by roads and trails

Although good highways have been under construction in some districts since about 1916, good wagon roads are still nearly as scarce as railways. Ecuador once started to build one from Quito to Guayaquil; but the workmen stopped after completing 115 miles of it, and have never taken up the task since. Can you imagine why? Recall what has been said about the difficulty of building railroads and keeping them in repair.

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Fig. 271. — A pack train of llamas at Cerro de Pasco, Peru

Llamas are commonly used as pack animals in Peru and Bolivia. What indications do you see in this picture that there is an Indian population there?

It is fairly safe to say that a majority of all the people in these countries have never seen a well-built dirt road, to say nothing of a paved one. In that case, how do they get about? And how do they transport goods? The first answer is that they go about very little. Why should they? The second is that when they do travel, or carry goods, they follow the most primitive methods imaginable.

For instance, a man living on the plateau bought a small piano abroad that was landed at a little town on the coast far from any railroad. It was wrapped carefully in burlap; a long, strong pole was firmly lashed to each side; then eight men, two at each corner, lifted it by slipping their shoulders under the ends of the poles, and bore it away. Eight more men followed, who after a time relieved the first eight of their burden. Thus the sixteen men trudged slowly along, hardly setting the piano down during a half day at a time. In this way they journeyed for 200 miles.

It is clear why pack animals, such as the llama and the burro, are so important in these countries. Where paths or trails are the only transportation routes, a considerable portion of the burdens must be carried on their backs. The packages must on this account be reasonably small and very well packed. Heavy pieces of mining machinery and large plate-glass windows would be impossible; even a sewing machine or a full barrel of oil might cause trouble.

These facts give some idea about the trade we can expect with these countries. Some

commodities are imported by us in fairly large quantities; for example, cocoa and Panama hats from Ecuador, tin from Bolivia, and coffee, sugar, and tropical fruits from several of them. We should like more of these products, but cannot get them. Our exports to these countries are still less, because the needs of the inhabitants are very few. We send them flour and other foodstuffs, petroleum, clothing, and some other kinds of manufactured goods; but in small quantities. We should like to send them far more, but what use have the mass of the people for automobiles, or wagons, or fine furniture, or cook stoves, or laundry machinery, or fine clothing? Until they are greatly changed they are not likely to desire even farm implements of a modern sort.

Effect of these obstacles upon our trade with them

While the prospect for trade seems poor, recent events bring some encouragement. White men from abroad have been making many experiments in these countries, some of which are proving very successful. Grazing in the valley of the Orinoco has been encouraged by the erection of slaughtering and refrigerating plants, and that section may thrive as it never has before. During the last thirty years Americans have been developing banana plantations near the coast of Colombia east of the Magdalena River, with good results. The copper ore, mined and smelted by Americans at Cerro de Pasco in Peru, is proving very valuable. Although they are 12,000 feet above the sea, there are about 12,000 natives and 150 Americans at work there, the latter serving as overseers, office men, and directors. At that altitude the air is so rare that no one moves about rapidly and only the very healthy dare undertake heavy labor. Yet the success of mining there gives hope that many other mines will be opened in this rich mineral region. Very recently, also, Guayaquil, under the guidance of our countrymen, has been cleaned up and made a fairly healthful city. Many Europeans also are showing great interest in these countries and are doing their utmost to encourage progress, for they see that every advance means more commerce.

Reasons for encouragement

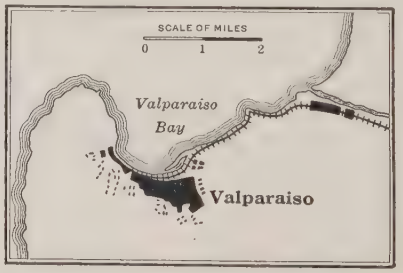

Fig. 272

III. Temperate South America

Leadership of this part of the continent. — The part of South America lying in the temperate zone contains two of the three leading countries of the continent; namely, Argentina and Chile. What two smaller countries does it also contain (Fig. 275)? In this section are three out of the four leading South American cities—Buenos Aires, Santiago, and Montevideo. Locate these. What is the fourth?

Similarity between Chile and our Pacific coast states. — Chile is sometimes called the "shoe-string republic" because it is so long and narrow. Its length is about 2,700 miles; if it were placed alongside our western coast, it would reach from the southern end of Lower California in Mexico to Juneau in Alaska. Its average width is only a little more than 100 miles. In spite of its narrowness, its area is nearly equal to that of our three Pacific coast states, and its population is three fourths as great.

In area, population, and surface features

In many respects there is a close similarity between

that country and the Pacific coastal region of North America. Along a considerable portion of the Chilean coast there is a low range of mountains corresponding to our Coast Ranges and the mountainous islands off the coast of British Columbia; and the lofty Andes form its boundary on the east, corresponding to the Sierra Nevada-Cascade ranges and the Coast Range in Canada. Between these two mountain systems is a long, narrow valley corresponding to the Valley of California and the lowland extending northward through Oregon and Washington to Puget Sound; and south of 42° S. Lat. is an "Inside Passage," similar to the Inside Passage to Alaska.

In climate and agriculture

The climate, also, is very similar. The part nearest the equator, like southern California, gets little wind from the ocean (Fig. 242), and is therefore arid (Fig. 255). But the rainfall increases toward the south, being heavy in southern Chile as in Washington and western British Columbia. Thus the winds affect the two regions in the same manner.

The Great Valley in Chile, which is about 600 miles long and averages fifty miles in width, lies between these two extremes and, like the Valley of California, must be irrigated over much of its area. Only in its southern portion is the rainfall sufficient for agriculture. The lofty Andes, however, supply the needed water in abundance, like the Sierra Nevada and the Cascades. The district in which Santiago is situated also has winter rains, as does California. Why? In what temperature regions is Chile (Fig. 254)?

The agricultural products of the two regions are much the same. Recall those of the Pacific coast states (pp. 140 and 148). The more common cereals and garden vegetables flourish in Chile, as well as many kinds of fruit. Among the latter, grapes are especially common, as in California; and in the southern part of the valley, where it is cooler, apples are abundant, as in Oregon and Washington.

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Fig. 273. — The harbor of Valparaiso

Vessels find little shelter in this harbor when the wind is from the north or northwest. Can you tell why? In the background one can see vessels at anchor. These will load or unload from lighters.

The southern portion of the country contains extensive forests, but these, unlike those of western North America, have not proved valuable for lumbering, the woods being so soft that they decay rapidly.

Some of the differences

Yet Chile lacks one great advantage that our Western States enjoy; it has no good harbors. The principal port on all the Chilean coast is Valparaiso (Fig. 273), which is scarcely a harbor at all and is unworthy of comparison with

our own Western harbors. No doubt many other differences in appearance and customs would seem striking to a resident of California who might visit Chile. Can you suggest some of them? Keep in mind the mixture of races, the peonage system, which is very common (p. 193), and the prevalence of other Spanish customs.

Why Chile greatly surpasses the other Andean countries in importance. — While Chile is much smaller than any of the other Andean countries except Ecuador, there is no area in any of them that compares with the Great Valley of Chile in fertility and development. Santiago, the capital and chief city, with a population of 416,000, is near its northern end, with Valparaiso as its port (Fig. 275). Note how many other towns of importance there are, and how many railroads connect them. Note, also, the railroad extending across the Andes from Valparaiso to Buenos Aires. It is the only transcontinental line in South America, though there are two shorter railway systems that cross the Andes farther north. The railway which extends along the interior valley has more than 2,800 miles of track. Chile has in all more than 8,000 miles of railway, which is greater than the mileage in all the other Andean countries combined.

The productive character of the Great Valley

The delightful climate of this valley, together with the other advantages it affords, is the chief explanation of the greater importance of Chile.

Character of the people

But the character of the people is also a factor. It is estimated that forty per cent or more are of pure white stock, most of the remainder being *mestizos*, or of mixed blood. The natives make up only a small part of the population. Such a large proportion of people of European origin has exerted a marked influence. Between 1860 and 1920 about 50,000 Europeans, mostly Germans and French, emigrated to this land. Do you consider this a large amount of immigration?

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Fig. 274. — A deep cut on the Trans-Andean Railway, near Uspallata Pass

What cities does this railroad connect? What cities does it pass through? In the winter the trains have much trouble with snow in the higher portions of the route across the Andes. What are the winter months here?

In mineral wealth, with one exception, Chile has no great advantage over the other

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Questions on Fig. 275. — 1. The southernmost cities of the world are shown on this map. Name them. How do they compare in latitude with London? Petrograd? Stockholm? 2. How does the area over 10,000 feet in elevation compare with that in North America (Fig. 1)? 3. With what mountains in South Dakota (Fig. 77) may the Sierra de Cordoba be compared? Why? 4. From their railroad mileage, what conclusion do you draw regarding the comparative importance of Uruguay and Paraguay?

TEMPERATE
SOUTH AMERICA
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300 400 500
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
Sea level to 1000
Capitals of countries
Railroads
WILLIAMS ENGRAVING CO., N.Y.
Longitude West from Greenwich
BOLIVIA
PARAGUAY
URUGUAY
BRAZIL
ARGENTINA
CHILE
PACIFIC OCEAN
ATLANTIC OCEAN
Andes Mts.
Gran Chaco
Pampas
Patagonia
Plateau of Patagonia
Brazilian Highlands
Plateau of Bolivia
Coast Range
Sierra de Cordoba
Serra do Mar
Serra do Espinhaço
Arica
Pisagua
Iquique
Tocopilla
Antofagasta
Taltal
La Serena
Coquimbo
Vina del Mar
Valparaiso
Santiago
San Fernando
Curico
Talca
Chillan
Talcahuano
Concepcion
Los Angeles
Temuco
Valdivia
Puerto Montt
Ancud
Castro
Chiloe I.
Chonos Archipelago
Taytao Peninsula
Gulf of Penas
Campana I.
Wellington I.
Hanover I.
Queen Adelaide Archipelago
Strait of Magellan
Punta Arenas
Tierra del Fuego
Ushuaia
Staten I.
Cape Horn
Santa Inez I.
Sahama Vol. 21,047 ft.
Cochabamba
Lake Aullagas
Sucre
Potosi
Oran
Tropic of Capricorn
Jujuy
Salta
Tucuman
Vol. Copiapo 16,667 ft.
Santiago del Estero
Salinas Grandes
Mt. Aconcagua 22,860 ft.
Uspallata Pass 12,870 ft.
Mendoza
San Luis
San Juan
Villa Mercedes
Rufino
Buenos Aires
Chivilcoy
La Plata
Santa Rosa
Dolores
C. San Antonio
C. Corrientes
Mar del Plata
Bahia Blanca
Blanca Bay
Colorado R.
Neuquen
Zapala
Rio Negro
Puerto San Antonio
San Matias Gulf
Lake Nahuel Huapi
Chubut R.
Gulf of St. George
Lake Buenos Ayres
C. Blanco
Puerto Deseado
Deseado R.
Chico R.
Lake Argentino
Stanley
Falkland Islands (British)
Pilcomayo R.
Bermejo R.
Salado R.
Paraguay R.
Parana R.
Uruguay R.
Asuncion
Villa Rica
Concepcion
Corrientes
Col. Ijuhy
Santa Maria
Uruguayana
Luque
Iguassu Falls
Paranagua
Porto Alegre
Lagoa dos Patos
Pelotas
Rio Grande do Sul
Jaguarao
Lake Mirim
Paysandu
Salto
Rosario
San Nicolas
Mercedes
Montevideo
Cordoba
Santa Fe
Parana
Rio Cuarto
Jupia
Porto Tibirica
Rio Grande
Paranapanema R.

Fig. 275

Andean countries. Recall their mineral products. Silver is obtained in the central and northern portions of the country, Antofagasta being the port for the output of some of the most productive silver mines. Coal is mined near Concepcion and at some other places, and copper and gold are produced in large quantities. There are also large deposits of iron ore. But the exception just mentioned is more important than all the other minerals combined: we refer to the immense deposits of nitrate of soda, which are in demand throughout the civilized world for fertilizing the soil.

Extent of mining

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Fig. 276. — Sacking nitrate in the Atacama Desert

The nitrate beds are found in northern Chile twenty to forty miles inland, and extend through the Atacama Desert about 300 miles southward from the vicinity of Iquique. The railroad that parallels the coast (Fig. 275) indicates their location. Scarcely a drop of rain falls here from one year to the next; consequently no food plants for man are grown, nor are there any materials for houses. A more desolate region could hardly be imagined. Yet the want of rain has proved a great blessing, for the nitrate which makes this area one of the most important sources of Chile's wealth might otherwise have been washed away.

The nitrate exists in the form of rock found either on the surface or a few feet underground. It is blasted out by dynamite; the pieces are then crushed by machinery into a powder, which is boiled until the nitrate is dissolved and separated from other materials. This liquid is then evaporated until nothing is left but crystals that look much like ordinary salt. This is the nitrate, which is packed into sacks or thrown into piles for shipment abroad. A few years ago England and Germany imported much more of it than we did; we did not realize our need. But we now see the importance of fertilization, and our imports are sure to increase.

Why Argentina is often called the United States of South America. — Argentina is often called the United States of South America. It is the largest, the most populous, and the wealthiest of the South American countries that were settled by the Spanish. Brazil is far greater in area and population, but it is Portuguese rather than Spanish in origin. Argentina lies in the same temperature belts as the United States. What are they (Figs. 12 and 254)? Being therefore suited to occupation by a white population, and facing the Atlantic, it has enjoyed a

stronger tide of immigration from Europe than any of its neighbors. Among the recent European settlers the Italians are most numerous, though many of them return to Italy after each harvest is over. They form about one seventh of the population, and at one time came near making Italian the leading language; but Spanish has held its own in spite of them. The inhabitants are nearly all white, the number of Indians and people of mixed blood being very much smaller than in the other South American countries. This large proportion of whites is due to the fact that the vast extent of grassland (pampas) supported only a sparse native population, which was easily displaced by the early Spanish invaders. The people, therefore, are better educated than many of their neighbors, and are noted for their energy, thrift, and progressiveness. Yet even in Argentina education is by no means general, for about one half of the adult population can neither read nor write.

The similarity of Argentina and Uruguay to the part of the United States east of the Rocky Mountains. — Just as Chile has many points of similarity to our Pacific States, so Argentina and Uruguay resemble the portion of our country east of the Rocky Mountains. Since their combined area is only a little more than one third the area of the United States, this region is only about as large as the region between the Rocky Mountains and the Mississippi River. There is not such an extensive plateau east of the Andes as there is just east of the Rockies, nor are there any highlands corresponding to the Appalachian system.

In surface features

Nevertheless, any one traveling from Santiago to Buenos Aires would be struck with the similarity of the Argentine plains to our West North Central States (Fig. 20). Along the eastern border of the Andes is a plateau about 200 miles wide, broken on its west border by spurs from the mountains. This corresponds to our Great Plains, though it is of course much narrower. This plateau slopes rapidly eastward and merges into a low plain. Then, for the remaining 500 miles or more, except for the Sierra de Cordoba, one sees scarcely a hill or a ridge or a tree. The soil, also, is rich and deep, as in our North Central States. Similar conditions hold in regard to the land north and south of the Trans-Andean Railway for hundreds of miles. The region is an enormously large reproduction of the flat Dakota wheat country. This is the famous pampas region of Argentina.

Fig. 255 indicates a striking similarity of rainfall to that east of the Rocky Mountains. Just east of the mountains there is an extensive area where the fall is under ten inches. This gradually increases, however, toward the north and east until the amount at Rosario is forty inches and at Buenos Aires about thirty-five. How does this compare with the rainfall eastward from the Rocky Mountains (Fig. 18)?

In climate

The reasons for the variation are the same in the two cases. In Fig. 242 note the section under the influence of the westerlies, and explain why the strip of land just east of the Andes receives so little moisture. Also, by observing the direction of the winds in the part of northern Argentina next to the mountains, explain the slight rainfall. What reasons do you see for the much greater rainfall to the east and north?

There is, however, one important difference in climate. Buenos Aires, which is not far from the middle of Argentina in a north

and south direction, is in the same latitude as Memphis. But Argentina extends considerably farther toward the equator than the United States, even including Florida; it also extends farther toward the pole. Estimate how much nearer it comes to the equator and the pole than the section of our country which most closely corresponds to it. What advantage over us, if any, do you see for Argentina in this difference?

Fig. 277

Fig. 278

The heart of Argentina is the *pampas* or grassland which reaches as far south as the Colorado River, west to the arid section, and northward to about the thirtieth parallel. Observe how that area compares in agricultural products with our West North Central States.

In farm products

Fig. 279

Fig. 280

From The Geography of the World's Agriculture (1914)

Notice that, as in the United States, the corn and wheat areas are more limited than the areas adapted to grazing; notice also that sheep thrive under a greater variety of conditions than cattle.

The most important crop is wheat, and the next is corn. The latter, as shown in Fig. 277, is grown near the eastern edge of the plain, where the rainfall is thirty inches or more. The farms are smaller there than in other parts of Argentina and Uruguay and the cultivation is more intensive. Although much less corn is raised than in our country, far more is exported because so little is consumed at home. Little is grown east of the Plata River in Uruguay because the land there is too swampy.

Wheat is grown chiefly west of the corn area (Fig. 278), little being grown in Uruguay because the land there is used so largely for grazing. How does this location of the wheat belt in the southern hemisphere correspond to its location in North America? In North America wheat is grown much farther north than corn. Why, then, is it not grown farther south in the southern hemisphere? The fact that wheat lands in Canada have been taken up only recently may suggest an explanation. As in the case of corn, a great portion of the wheat is exported. This region also produces far more flax for seed than the United States, and a very large amount of alfalfa.

As in the United States, live stock is raised in large numbers where grass and

grain, particularly corn, are abundant. What kinds of live stock were found to be most abundant in the North Central States (p. 71)? Swine are not raised in great numbers in Argentina or Uruguay, but Fig. 279 shows how numerous are the cattle, especially in Uruguay. While Argentina is only one third as large as the United States and has less than one tenth the population, it raises about one half as many cattle.

In number of sheep Argentina nearly equals our country. Fig. 280 shows that although they are widely distributed, the greatest number is found within the area near Buenos Aires. Note also the extent to which they are raised in Uruguay. The reason for so many in the distant land of Tierra del Fuego is that the Andes are so low there that they permit the westerlies to carry considerable moisture to their eastern slopes, thus affording good pasture.

From all these facts it is plain that the area about Buenos Aires, including Uruguay, approaches our North Central States in importance as a granary and meat center.

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Fig. 281. — The capitol building in Buenos Aires

The republics of South America adopted our form of government after winning their independence from Spain between about 1810 and 1830. What building in Washington, D. C., does this resemble?

Advantages of this region for transportation. — These agricultural industries could never have been developed as they have been on the pampas without excellent means for transportation. The Plata River and its tributaries correspond to the Mississippi and its tributaries in their contribution to the early development of this section; that river, in fact, has nearly as many miles of navigable waters as the Mississippi. Trace its principal tributaries and note their importance for the development of Uruguay and Paraguay, as well as Argentina. Find how nearly the Plata Basin equals the Mississippi Basin in extent (p. 488).

Its dependence upon river transportation

The dependence of this region upon its rivers is suggested by the fact that many of the large cities are located upon them. The greatest is Buenos Aires, on the estuary of the Plata River, the eleventh city of the world in size, often compared with Paris on account of its magnificence. While New York City contains about one nineteenth of our population, Buenos Aires contains more than one fifth of the inhabitants of Argentina. It is, therefore, even more than the New York of that country; while Rosario, 190 miles distant up the Parana River and

more nearly in the center of the grain and stock region, might be called its Chicago. Other cities in this region that owe their growth to the influence of the pampas are La Plata, Santa Fé, and Bahía Blanca; so also does Cordoba on the western border of the pampas. Montevideo is to Uruguay what Buenos Aires is to Argentina. About what proportion does it contain of the entire population of that country? It is thus evident that the inhabitants of temperate South America live in the cities more than do those of the United States. Yet these are not manufacturing countries, as we shall see later.

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Fig. 282. — The university at Montevideo

In Brazil, Uruguay, Argentina, and Chile public education is liberally provided for. This large university is in every way the equal of many of the universities in the United States.

While a great part of the fertile region lacks navigable rivers, its level surface has made railroad construction as easy as on our central plains. That fact, coupled with the unusual energy and intelligence of the people, has led to extensive construction of railways. Fig. 275 indicates a mileage nearly equal to that of all the other countries of South America combined. With how many other countries is Argentina connected by rail?

Its network of railroads

Since the export of food products is one of the chief interests of Argentina, these advantages for transportation are of great importance. Because it has sent its foods to Europe in competition with our own shipments, it is interesting to consider one great advantage that it has enjoyed over us. Its principal grain and live stock areas are near the coast, while ours are deep in the interior of our continent. Such products can, therefore, reach ship by a much shorter haul than with us. On the other hand, what can you say about the length of the voyage to Europe compared with that from New York? Who has the advantage there?

Advantages and disadvantages for foreign trade

Prospects for the growth of Argentina.—What is the prospect for the growth of Argentina? It has a very sparse population and is, no doubt, only in the beginning of its development. A very small part of the land that is suitable for farming is now under cultivation. The area given to wheat could probably be trebled; and improvements in the method of its cultivation could probably increase the present yield of eight to twelve bushels per acre from three to five times.

Its agricultural possibilities

From one third to two fifths of the area of Argentina is semi-desert, but irrigation from the mountain streams and dry farming can both be carried much further than at present. The possibilities in the arid region are suggested by the wonderful development

of the grape industry about Mendoza, the chief Andean city of Argentina, where the rainfall is only six inches per year.

The warm northern portion also has great possibilities for agriculture. Tucuman has long been a noted center for the production of sugar cane by irrigation, and other tropical and semi-tropical products can flourish in that vicinity. In other sections of the north where there is no forest and rain is abundant, rice and cotton and sugar cane can be cultivated. In Paraguay, near by, oranges are extensively grown; also Paraguay tea, which is very popular in the countries of South America.

Its forest resources

Northern Argentina, moreover, has extensive forests that are proving of great value. The most important tree is the *quebracho*, a name that means *break-axe* and that was given on account of the hardness of its wood. It is especially useful for railroad ties and fence posts, and when cut up into small pieces and boiled in water produces a compound valuable for tanning leather. Lumbering in this region is likely to increase greatly in the near future, and the clearing of the forests will make way for more farming and grazing.

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Fig. 283. — A flock of sheep in the southern part of Chile

Why Argentina is not likely to become an important competitor of the United States. — With such promise for the future, what is the prospect that Argentina will become an important competitor of the United States? There is little prospect, so long as the conditions for manufacturing are as unfavorable as at present. The Andean section is the only one from which minerals can be expected, and thus far there has been little mining. Moderate amounts of gold, silver, copper, lead, coal, and petroleum have been obtained. The deposits of precious metals throughout the Andean region are known to be large, but the want of extensive deposits of iron ore and coal prevents the extensive development of the iron industry. Such manufacturing as is done, therefore, must be of the kind that meets local wants, or that is concerned with the first stages in the preparation of raw materials for the market. For example, dairying is becoming prominent; flour mills are numerous; and sugar and wine are produced. The principal products for export are those connected with cattle and sheep; as, for example, fresh meat, dried beef, hides, tallow, and wool. Since we have become an industrial nation, these are all things that we are more likely to want to buy than to sell. There is, therefore, no likelihood of any keen competition between Argentina and the United States.

The close relation between temperate South America and the United States.— Our need of their products While Chile, Argentina, and Uruguay are so much like the United States, we are likely to be close friends rather than rivals in the future. As our population increases we shall need most of the products that these countries can spare.

Modern inventions have greatly aided this close relation. Formerly only wool and the hides of cattle and sheep, used for leather, could reach us. The meat had to be thrown away, because it spoiled on the voyage. But since the invention of refrigerator compartments in ships and refrigerator cars, this enormous waste has been avoided, and beef and mutton from Argentina and Uruguay now reach our cities in good condition. The fact that the wheat of Argentina is harvested during our winter may steady the price of flour for us, which is itself an important benefit.

Our need of nitrate from Chile for fertilizing the soil has already been mentioned. That country, also, has summer during our winter and is now so close to us, owing to the Panama Canal, that her fresh fruits and vegetables may be brought to us during our coldest weather in perfectly fresh condition. For many reasons, therefore, we are likely to be a good customer for this portion of South America.

On the other hand, they need our products as much as we need theirs. All new countries have to rely upon older ones for capital to develop many of their industries. Expensive irrigation projects, for example, must be financed. Railroad construction must be undertaken on a large scale, and in the near future many locomotives, rails, cars, and other railway materials must be imported. These countries are now using great quantities of our farm machinery, particularly Argentina, but still greater quantities must soon be called for. Even if they had an abundance of coal and iron, they would have to import many manufactured goods until factories of their own were established. But since they have not, they are especially dependent upon other countries for machinery, textiles, furniture, and other manufactured articles of all descriptions.

Their need of our products and capital

The United States is the wealthiest nation in the world, and also the greatest in manufacturing. We are in a good position, therefore, to supply capital for new undertakings. Since the leading countries of Europe have been so impoverished by the World War, our advantage in wealth is very great. Our enormous manufactures enable us likewise to supply railroad material, farm implements, textiles, and other articles almost without limit.

Why the United States ought to be their best customer

Until recently our trade with South America has been considerably less than that of some European powers. This was largely our own fault. We failed to learn their language, to study their needs, to adapt our goods and requirements to their desires and customs, and to send trained business men to represent us and to get their trade. We see our folly now, and the Panama Canal and the World War have given us a great advantage. Under these conditions we can expect to lead the world in trade with this region. Indeed, since the war it has already greatly increased.

An important step toward closer friendship with South America. — Important attempts, aside from trade, have been made to establish closer friendship among the republics

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Fig. 284. — Mountains bordering the Strait of Magellan

Locate this strait on Fig. 275. It is about 350 miles long and from ten to fifty miles wide. It is difficult to navigate because of fogs, strong currents, and reefs.

of the New World. There are twenty-one of these in all, including those of North and South America and of the West Indies. See if you can make a complete list of them. Largely under the influence of the United States, a union of these has been brought about, called the Pan-American Union. (*Pan* is a Greek word meaning *all.*)

Many years ago when these republics were much weaker than now, the United States declared that the nations of the Old World should not be allowed to establish new colonies in America or to oppress any of the nations here. This declaration has been known as the Monroe Doctrine because it was made during the administration of President Monroe. It has helped to protect these nations against foreign powers.

The Pan-American Union aims to distribute the responsibility for such protection more equally among the American republics. It aims, also, to cultivate a closer acquaintance and friendship among them, and thus to promote peace in the New World. Its headquarters are at Washington, D. C.

Facts to be especially well fixed. — 1. Where the equator crosses South America. 2. The temperature regions from north to south. 3. The distribution of rainfall. 4. The distribution of different types of vegetation. 5. Location of the following cities: Buenos Aires; Rio de Janeiro; Santiago; Montevideo; Bogota; Quito; Valparaiso; Guayaquil; La Plata; Rosario; Mendoza. 6. Where coffee is obtained; rubber; cocoa; Panama hats; grain; meat. 7. The outline of South America. 8. Location of the three great rivers and of the Andes Mountains. 9. The three leading countries of South America.

Comparisons with North America. — 1. Describe the effects of the trade winds on each continent (Fig. 242 and pp. 191 and 262). 2. Of the prevailing westerlies (Fig. 242 and pp. 130 and 271). 3. Locate the arid sections in each continent and give the reasons for lack of rain (Figs. 13 and 255). 4. Point out the rainiest section in each, and state the causes. 5. Into what ocean do the principal rivers of each continent flow? 6. Make a list of important farm products common to the United States and South America. 7. Name several agricultural products that are extensively raised in one and not in the other. 8. Make as complete a list as possible of the agricultural and mineral products in which North America excels South America; in which South America excels North America.

Problems for independent study. — 1. The Pilgrim Fathers seriously considered settling on the coast of Guiana rather than that of New England. What do you think about the wisdom of their choice? Allen, N. B.: *Geographical and Industrial Studies: South America*, pp. 62–75 (Ginn); National Geographic Magazine, September, 1920, vol. 38; Bowman, I.: *South America*, Chapter XVII (Rand, McNally); Browne, E. A.: *Peeps at Many Lands: South America*, pp. 4–9 (Macmillan). 2. If you were emigrating to South America, where would you prefer to settle? Why? 3. Chile and Texas resemble each other fairly closely in area and population. Which has the better prospects for further growth? Plan a debate with some one on this question. Allen, N. B.: *Geographical and Industrial Studies: South America*, p. 245; Bowman, I.: *South America*, Chapters V, VI; Chamberlain, J. F., and Chamberlain, A. H.: *South America*, pp. 111–127 (Macmillan). 4. The Plata Basin is nearly as large as the Mississippi Basin. Will it ever equal the Mississippi Basin in importance? Allen, N. B.: *Geographical and Industrial Studies: South America*, pp. 145–146, 185–190; Bowman, I.: *South America*, Chapter IV; Wade, M. H.: *Twin Travelers in South America*, Part II, Chapter III (Stokes); Bryce, J.: *South America*, pp. 316, 324–325 (Macmillan). 5. Is the location of the mouth of the Plata more or less favorable to commerce than that of the Mississippi? 6. Make a list of products of South America that you have often seen. 7. Find out some of the plans of the Pan-American Union for promoting friendship among the twenty-one republics of the New World. 8. Estimate how much distance is saved by going from New York or New Orleans to Guayaquil via the Panama Canal rathar than via Cape Horn or the Strait of Magellan. 9. Learn more about nitrate of soda from Chile; for example, the quantity we import, in what part of the United States it is used, and its cost. Allen, N. B.: *Geographical and Industrial Studies: South America;* Bowman, I.: *South America;* Bryce, J.: *South America*, pp. 207–210. 10. Make a drawing of the Plata River system and locate the chief cities upon it. 11. Compare Argentina with Canada in wheat production and export. Consult *World Almanac; The Statesman's Year Book* (Macmillan). 12. Good highways are sadly lacking in Argentina, as in many parts of the United States. Write a composition showing how better roads would benefit that country. 13. Watch the newspapers for articles or news items on South America. 14. Write to the United States Rubber Co., 1790 Broadway, New York City, for its booklet, *Rubber a Wonder Story;* or to the Goodrich Rubber Co., Akron, Ohio, for its booklet, *The Romance of Rubber*. 15. The South Americans are as proud of Rio de Janeiro as we are of New York. Why? Allen, N. B.: *Geographical and Industrial Studies: South America;* Bowman, I.: *South America;* National Geographic Magazine, September, 1920, vol. 38; Browne, E. A.: *Peeps at Many Lands: South America*, pp. 40–50.

REFERENCE MAP OF THE
UNITED STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300 400
National capitals ✲
State capitals ⊙
Railroads
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Below sea level
WILLIAMS ENGRAVING CO., N.Y.
Longitude
West
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
WASHINGTON
OREGON
IDAHO
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
NEVADA
UTAH
COLORADO
KANSAS
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
MEXICO
PACIFIC OCEAN
GULF OF CALIFORNIA
Vancouver
Victoria
Seattle
Portland
Spokane
Tacoma
Salem
Eugene
Boise
Helena
Billings
Great Falls
Missoula
Butte
Bismarck
Fargo
Minneapolis
Winnipeg
Regina
Calgary
Edmonton
Denver
Colorado Springs
Pueblo
Cheyenne
Omaha
Lincoln
Wichita
Kansas City
Salt Lake City
Ogden
Provo
Las Vegas
Reno
Carson City
Sacramento
San Francisco
Oakland
San Jose
Los Angeles
San Diego
Tijuana
Phoenix
Tucson
Albuquerque
Santa Fe
El Paso
Juarez
Houston
Dallas
Fort Worth
San Antonio
Austin
Oklahoma City
Tulsa
Chihuahua
Monterrey
Saltillo
Mexico City
Guadalajara
Hermosillo
Mazatlan
Grand Canyon
Yellowstone
Glacier
Rocky Mountains
Sierra Nevada
Cascade Range
Mojave Desert
Death Valley
Great Salt Lake
Colorado River
Rio Grande
Missouri R.
Columbia R.
Snake R.
Yukon R.
Mackenzie R.
Hudson Bay
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Lake Winnipeg
Lake Athabasca
Great Bear Lake
Great Slave Lake
Gulf of Mexico
Gulf of California
Pacific Ocean
Atlantic Ocean
Arctic Ocean
Baffin Bay
Davis Strait
Labrador
Newfoundland
Greenland
Iceland
Alaska
Yukon Territory
Northwest Territories
Nunavut
Ellesmere Island
Baffin Island
Victoria Island
Banks Island
Melville Island
Prince of Wales Island
Vancouver Island
Queen Charlotte Islands
Aleutian Islands
Hawaiian Islands
Bermuda
Cuba
Jamaica
Haiti
Dominican Republic
Puerto Rico
Bahamas
Yucatan Peninsula
Central America
Panama Canal
Panama
Costa Rica
Nicaragua
Honduras
Guatemala
Belize
El Salvador
Caribbean Sea
Gulf Stream
Equator
Tropic of Cancer
Arctic Circle
Antarctic Circle
Prime Meridian
International Date Line
Time Zones
Standard Time
Daylight Saving Time
Greenwich Mean Time
Coordinated Universal Time
Eastern Time Zone
Central Time Zone
Mountain Time Zone
Pacific Time Zone
Alaska Time Zone
Hawaii Time Zone
Atlantic Time Zone
Newfoundland Time Zone
Yukon Time Zone
Northwest Territories Time Zone
Nunavut Time Zone
Labrador Time Zone
Greenland Time Zone
Iceland Time Zone
Alaska Time Zone
Hawaii Time Zone
Bermuda Time Zone
Cuba Time Zone
Jamaica Time Zone
Haiti Time Zone
Dominican Republic Time Zone
Puerto Rico Time Zone
Bahamas Time Zone
Yucatan Peninsula Time Zone
Central America Time Zone
Panama Canal Time Zone
Panama Time Zone
Costa Rica Time Zone
Nicaragua Time Zone
Honduras Time Zone
Guatemala Time Zone
Belize Time Zone
El Salvador Time Zone
Caribbean Sea Time Zone
Gulf Stream Time Zone
Equator Time Zone
Tropic of Cancer Time Zone
Arctic Circle Time Zone
Antarctic Circle Time Zone
Prime Meridian Time Zone
International Date Line Time Zone
Time Zones Time Zone
Standard Time Time Zone
Daylight Saving Time Time Zone
Greenwich Mean Time Time Zone
Coordinated Universal Time Time Zone

Fig. 499

Cities with over 1,000,000 — New York
Cities with 200,000 to 1,000,000 — Cleveland
Cities with 50,000 to 200,000 — Richmond
Other places — Elmira
from Greenwich
93°
89°
85°
81°
77°
73°
69°
45
41
37
33
29
25
ONTARIO
QUEBEC
MAINE
VT.
N.H.
MASS.
CONN.
R.I.
N. BRUNSWICK
MINNESOTA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NEW YORK
NEW JERSEY
MISSOURI
KENTUCKY
WEST VIRGINIA
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
ARKANSAS
LOUISIANA
GULF OF MEXICO
ATLANTIC OCEAN
BAHAMA ISLANDS
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Lake Nipigon
Rainy Lake
Red Lake
Ohio R.
Mississippi
Missouri R.
Delta
Tennessee R.
Cumberland R.
Arkansas R.
Red R.
Ozark Plateau
Appalachian Mts.
Blue Ridge Mts.
Florida Keys
Gulf Stream
Bay of Fundy
Chesapeake Bay
Delaware Bay
Tampa Bay
Apalachee Bay
Albemarle Sound
Pamlico Sound
Hudson R.
Mohawk R.
Susquehanna R.
Potomac R.
Rappahannock R.
James R.
Roanoke R.
Savannah R.
Chattahoochee R.
Alabama R.
Tombigbee R.
Yazoo R.
Red River
Brazos R.
Colorado R.
Rio Grande
Pecos R.
Platte R.
Kansas R.
Arkansas R.
Wabash R.
Illinois R.
Kaskaskia R.
Green R.
Cumberland Gap
Niagara Falls
Detroit R.
St. Clair R.
St. Lawrence R.
Ottawa R.
Saginaw Bay
Georgian Bay
Strait of Mackinac
Lake Champlain
Lake George
Lake Okeechobee
Everglades
Florida Strait
Key West
C. Sable
C. Canaveral
C. Fear
C. Lookout
C. Hatteras
C. May
Nassau
Miami
Havana
Duluth
Minneapolis
St. Paul
Chicago
Milwaukee
Detroit
Cleveland
Toronto
Buffalo
Rochester
Syracuse
Albany
Boston
Providence
New York
Newark
Jersey City
Philadelphia
Atlantic City
Pittsburgh
Harrisburg
Baltimore
Washington
Columbus
Cincinnati
Indianapolis
Louisville
St. Louis
Kansas City
Omaha
Sioux City
Des Moines
Davenport
Rock Island
Peoria
Springfield
Quincy
Evansville
Terre Haute
Fort Wayne
Toledo
Akron
Youngstown
Canton
Wheeling
Charleston
Richmond
Norfolk
Newport News
Petersburg
Lynchburg
Roanoke
Bluefield
Huntington
Ashland
Frankfort
Lexington
Paducah
Owensboro
Bowling Green
Memphis
Nashville
Chattanooga
Knoxville
Asheville
Charlotte
Greensboro
Raleigh
Durham
Wilmington
Columbia
Charleston
Savannah
Georgetown
Florence
Augusta
Atlanta
Macon
Columbus
Montgomery
Birmingham
Mobile
Pensacola
Tallahassee
Jacksonville
St. Augustine
Daytona
Orlando
Tampa
St. Petersburg
Miami
Key West
New Orleans
Baton Rouge
Shreveport
Vicksburg
Jackson
Meridian
Little Rock
Fort Smith
Hot Springs
Texarkana
Dallas
Fort Worth
Houston
Galveston
Austin
San Antonio
El Paso
Albuquerque
Santa Fe
Denver
Cheyenne
Omaha
Lincoln
Topeka
Wichita
Oklahoma City
Tulsa
Amarillo
Lubbock
Abilene
Waco
Corpus Christi
Brownsville
Laredo
Monterrey
Mexico City
Winnipeg
Fort William
Port Arthur
Sault Ste. Marie
Sudbury
North Bay
Ottawa
Montreal
Quebec
Halifax
St. John
Portland
Boston
Bangor
Augusta
Concord
Manchester
Burlington
Albany
Utica
Syracuse
Rochester
Buffalo
Niagara Falls
Cleveland
Toledo
Detroit
Grand Rapids
Lansing
Saginaw
Bay City
Flint
Port Huron
Sarnia
London
Hamilton
Kingston
Ottawa
Montreal
Quebec
Fredericton
St. John
Halifax
Charlottetown
Prince Edward Island
Newfoundland
Labrador
Hudson Bay
James Bay
Baffin Island
Greenland
Iceland
Ireland
Great Britain
France
Spain
Portugal
Morocco
Algeria
Tunisia
Libya
Egypt
Italy
Sicily
Malta
Greece
Turkey
Black Sea
Caspian Sea
Russia
Moscow
St. Petersburg
Poland
Germany
Berlin
Hamburg
Netherlands
Belgium
Paris
Switzerland
Austria
Vienna
Hungary
Budapest
Romania
Bulgaria
Yugoslavia
Czechoslovakia
Prague
Scandinavia
Stockholm
Oslo
Copenhagen
Finland
Helsinki
Arctic Ocean
Pacific Ocean
Alaska
Yukon
Northwest Territories
Hudson Strait
Davis Strait
Baffin Bay
Greenland Sea
Norwegian Sea
North Sea
English Channel
Bay of Biscay
Mediterranean Sea
Red Sea
Persian Gulf
Arabian Sea
Indian Ocean
Africa
Asia
Europe
North America
South America
Australia
New Zealand
Japan
China
India
Pakistan
Afghanistan
Iran
Iraq
Saudi Arabia
Yemen
Oman
Ethiopia
Somalia
Kenya
Uganda
Tanzania
Zaire
Angola
Zambia
Zimbabwe
Mozambique
South Africa
Namibia
Botswana
Madagascar
Mauritius
Reunion
Seychelles
Maldives
Sri Lanka
Bangladesh
Myanmar
Thailand
Laos
Cambodia
Vietnam
Malaysia
Singapore
Indonesia
Philippines
Taiwan
South Korea
North Korea
Mongolia
Kazakhstan
Uzbekistan
Turkmenistan
Kyrgyzstan
Tajikistan
Afghanistan
Pakistan
India
Nepal
Bhutan
Sikkim
Tibet
Qinghai
Gansu
Ningxia
Shaanxi
Shanxi
Inner Mongolia
Heilongjiang
Jilin
Liaoning
Hebei
Beijing
Tianjin
Shandong
Henan
Hubei
Hunan
Jiangxi
Anhui
Jiangsu
Shanghai
Zhejiang
Fujian
Guangdong
Guangxi
Hainan
Yunnan
Guizhou
Sichuan
Chongqing
Xinjiang
Xizang
Hong Kong
Macau
Taiwan
Philippines
Indonesia
Malaysia
Singapore
Brunei
Papua New Guinea
Australia
New Zealand
Fiji
Tonga
Samoa
Hawaii
Alaska
Yukon
Northwest Territories
Nunavut
Hudson Bay
James Bay
Baffin Island
Greenland
Iceland
Ireland
Great Britain
France
Spain
Portugal
Morocco
Algeria
Tunisia
Libya
Egypt
Italy
Sicily
Malta
Greece
Turkey
Black Sea
Caspian Sea
Russia
Moscow
St. Petersburg
Poland
Germany
Berlin
Hamburg
Netherlands
Belgium
Paris
Switzerland
Austria
Vienna
Hungary
Budapest
Romania
Bulgaria
Yugoslavia
Czechoslovakia
Prague
Scandinavia
Stockholm
Oslo
Copenhagen
Finland
Helsinki
Arctic Ocean
Pacific Ocean
Alaska
Yukon
Northwest Territories
Hudson Strait
Davis Strait
Baffin Bay
Greenland Sea
Norwegian Sea
North Sea
English Channel
Bay of Biscay
Mediterranean Sea
Red Sea
Persian Gulf
Arabian Sea
Indian Ocean
Africa
Asia
Europe
North America
South America
Australia
New Zealand
Japan
China
India
Pakistan
Afghanistan
Iran
Iraq
Saudi Arabia
Yemen
Oman
Ethiopia
Somalia
Kenya
Uganda
Tanzania
Zaire
Angola
Zambia
Zimbabwe
Mozambique
South Africa
Namibia
Botswana
Madagascar
Mauritius
Reunion
Seychelles
Maldives
Sri Lanka
Bangladesh
Myanmar
Thailand
Laos
Cambodia
Vietnam
Malaysia
Singapore
Indonesia
Philippines
Taiwan
South Korea
North Korea
Mongolia
Kazakhstan
Uzbekistan
Turkmenistan
Kyrgyzstan
Tajikistan
Afghanistan
Pakistan
India
Nepal
Bhutan
Sikkim
Tibet
Qinghai
Gansu
Ningxia
Shaanxi
Shanxi
Inner Mongolia
Heilongjiang
Jilin
Liaoning
Hebei
Beijing
Tianjin
Shandong
Henan
Hubei
Hunan
Jiangxi
Anhui
Jiangsu
Shanghai
Zhejiang
Fujian
Guangdong
Guangxi
Hainan
Yunnan
Guizhou
Sichuan
Chongqing
Xinjiang
Xizang
Hong Kong
Macau
Taiwan

Fig. 499

APPENDIX

TABLES OF AREA, POPULATION, ETC.

NOTE.—The figures, 1916, 1920, etc., refer to the year in which the census was taken or the estimate was made. Areas and populations are those included within the present boundaries of the various countries, although the census of the districts which make up the areas may have been taken before the fixing of the boundaries. Estimates are indicated by asterisks.

THE EARTH

Land area (square miles)	56,255,000	Length of axis (miles)	7,900
Water area (square miles)	140,295,000	Length of equator (miles)	24,900

CONTINENTS AND COUNTRIES

	Area in Square Miles	Population
North America	**9,455,700**	**145,000,000**
Alaska, 1920	590,900	55,000
Bermuda Islands, 1918	20	22,000
Canada, 1920	3,769,400	8,428,000
Alberta	255,300	497,000
British Columbia	395,600	400,000
Manitoba	251,800	554,000
New Brunswick	28,000	352,000
Nova Scotia	21,400	492,000
Ontario	407,300	2,799,000
Prince Edward Island	2,200	94,000
Quebec	706,800	2,380,000
Saskatchewan	251,700	833,000
Yukon Territory	207,100	9,000
Northwest Territories	1,242,200	18,000
Central America	219,500	5,516,000
British Honduras, 1918	8,600	42,000
Costa Rica, 1918	23,000	459,000
Guatemala, 1914	48,300	2,004,000
Honduras, 1916	44,300	606,000
Nicaragua, 1917	49,200	746,000
Panama, (exclusive of Canal Zone), 1912	32,400	337,000
Panama Canal Zone, 1920	500	23,000
Salvador, 1919	13,200	1,299,000
Greenland, 1911	827,300	13,000
Labrador, 1918	120,000	4,000
Mexico, 1910	767,200	15,116,000
Newfoundland, 1918	42,700	255,000
United States, 1920 (See p. 481)	3,027,000	105,709,000
West Indies	91,800	9,974,000
Bahama Islands, 1918	4,400	60,000
Cuba, 1919	44,200	2,899,000
Dominican Republic, 1918	19,300	955,000
Haiti, 1912	10,200	2,500,000
Jamaica, 1918	4,400	891,000
Lesser Antilles, 1918	5,600	1,343,000
Porto Rico, 1920	3,600	1,300,000
Virgin Islands of the U. S., 1917	130	26,000
South America	**7,222,000**	**62,630,000**
Argentina, 1918	1,153,000	8,279,000
Bolivia, 1915	514,000	2,890,000
Brazil, 1917	3,276,000	30,492,000
British Guiana, 1918	89,500	311,000
Chile, 1918	290,000	3,946,000
Colombia, 1918	441,000	5,420,000
Dutch Guiana, 1919	46,000	108,000
Ecuador, 1915	116,000	2,000,000
Falkland Islands, 1918	6,500	3,300
French Guiana, 1918	32,000	26,000
Paraguay, 1917	65,000	1,000,000
Peru, 1908	722,000	4,500,000
Uruguay, 1918	72,000	1,430,000
Venezuela, 1917	399,000	2,225,000
Europe	**3,900,000**	**455,000,000**
Albania, 1918	11,000*	825,000*
Andorra, 1918	191	5,000
Austria, 1920	32,100*	6,412,000*
Belgium, 1919	11,800	7,762,000*
British Isles, 1911	121,700	45,475,000
Great Britain	88,800	40,936,000
England	50,900	34,045,000
Wales	7,500	2,025,000
Scotland	30,400	4,866,000
Ireland	32,600	4,390,000
Other Islands	300	149,000
Bulgaria, 1920	42,000*	4,500,000*
Czecho-Slovakia, 1919	56,300	13,500,000*
Danzig, 1919	580	200,000*
Denmark (total), 1920	17,100*	3,171,000*
Faroe Islands, 1916	540	20,000
Esthonia, 1920	23,200*	1,750,000*
Finland, 1919	126,000*	3,277,000*
Fiume, 1920	8	50,000
France (total), 1919	212,700	41,476,000*
Corsica, 1906	3,400	291,000
Germany, 1920	171,900*	55,086,000*
Gibraltar, 1919	2	16,000
Greece (total), 1920	56,000*	5,500,000*
Crete, 1900	3,400*	310,000*
Hungary, 1920	36,600*	8,800,000*
Iceland, 1910	39,700	85,000
Italy, 1915	110,600	36,120,000
Italian Peninsula	91,400	31,446,000
Sardinia	9,300	881,000
Sicily	9,900	3,793,000
Jugo-Slavia, 1920	117,200	14,748,000*
Latvia, 1919	25,000*	1,250,000*
Liechtenstein, 1912	65	11,000
Lithuania, 1919	36,500*	3,000,000*
Luxembourg, 1916	1,000	264,000
Malta, 1911	118	229,000
Monaco, 1913	8	23,000
Netherlands, The, 1918	13,200	6,779,000
Norway, 1918	125,000	2,632,000
Poland, 1911	141,900	30,072,000
Portugal (total), 1911	35,500	5,958,000
The Azores	900	242,000
Madeira Islands	300	170,000
Rumania, 1915	122,300*	17,393,000*
Russia, 1915	1,371,200*	85,420,000*
San Marino, 1919	38	12,000
Spain (total), 1918	194,800	20,720,000
Balearic Islands	1,900	331,000
Canary Islands	2,800	514,000
Sweden, 1918	173,000	5,814,000
Switzerland, 1916	16,000	3,937,000
Turkey in Europe	2,200*	1,281,000*
Ukraine, 1919	498,100*	46,000,000*
Asia	**17,000,000**	**885,000,000**
Afghanistan, 1918	245,000	6,381,000
Arabian Peninsula	986,000*	4,850,000*
Aden, 1911	9,000	100,000*
Asir, 1920	20,000	1,500,000
Hejaz, 1920	100,000*	750,000*
Oman, 1920	82,000*	500,000*
Yemen, 1920	75,000*	1,000,000*
Remaining territory, 1920	700,000*	1,000,000*
Armenia, 1920	75,600*	4,028,000*
Azerbaijan, 1915	40,000*	4,615,000
Bhutan, 1918	20,000	250,000
Bokhara, 1918	83,000*	1,250,000*
Ceylon, 1918	25,500	4,686,000
Chinese Republic, 1919	4,277,100*	327,910,000*
China proper	1,532,400	302,110,000
Manchuria	363,600	20,000,000
Mongolia	1,367,600	2,600,000
Sinkiang	550,300	1,200,000
Tibet	463,200	2,000,000
Cyprus, 1911	3,600	274,000
Dutch East Indies, 1917	963,900	48,040,000
Borneo	289,800	2,355,000
Celebes	72,100	3,094,000
Java	50,600	34,157,000
New Guinea (See Islands of Pacific)		
Sumatra	159,800	5,027,000
Other islands	239,800	3,207,000
Georgia, 1915	35,500*	3,176,000
Indian Empire, 1911	1,802,600	315,156,000
Baluchistan	134,600	835,000
Burma	230,800	12,115,000
Indian Peninsula	1,437,200	302,206,000
Japanese Empire, 1920	260,700	77,005,000
Japan proper	148,800	55,961,000
Chosen (Korea)	84,000	17,284,000
Sakhalin	14,000	106,000
Taiwan (Formosa)	13,900	3,654,000
Khiva, 1918	24,000*	646,000*
Malay Peninsula	503,600	28,967,000
Federated Malay States, 1918	27,500	1,280,000
French Indo-China, 1914	256,000	16,990,000
Non-federated States, 1918	23,500	927,000
Siam, 1919	195,000	8,924,000
Straits Settlements, 1919	1,600	846,000
Mesopotamia, 1920	143,300	2,849,000
Nepal, 1918	54,000	5,600,000
Palestine, 1919	9,000*	648,000
Persia, 1918	628,000	9,500,000
Philippine Islands, 1918	115,000	10,351,000
Siberia, 1915	4,831,900	10,378,000
Steppes, The, 1915	710,900	4,017,000
Syria, 1920	106,700	3,134,000*
Transcaspian Province, 1915	235,100	553,000
Turkestan (Russian), 1915	420,800	6,684,000
Turkey in Asia, 1920	97,800*	3,719,000*

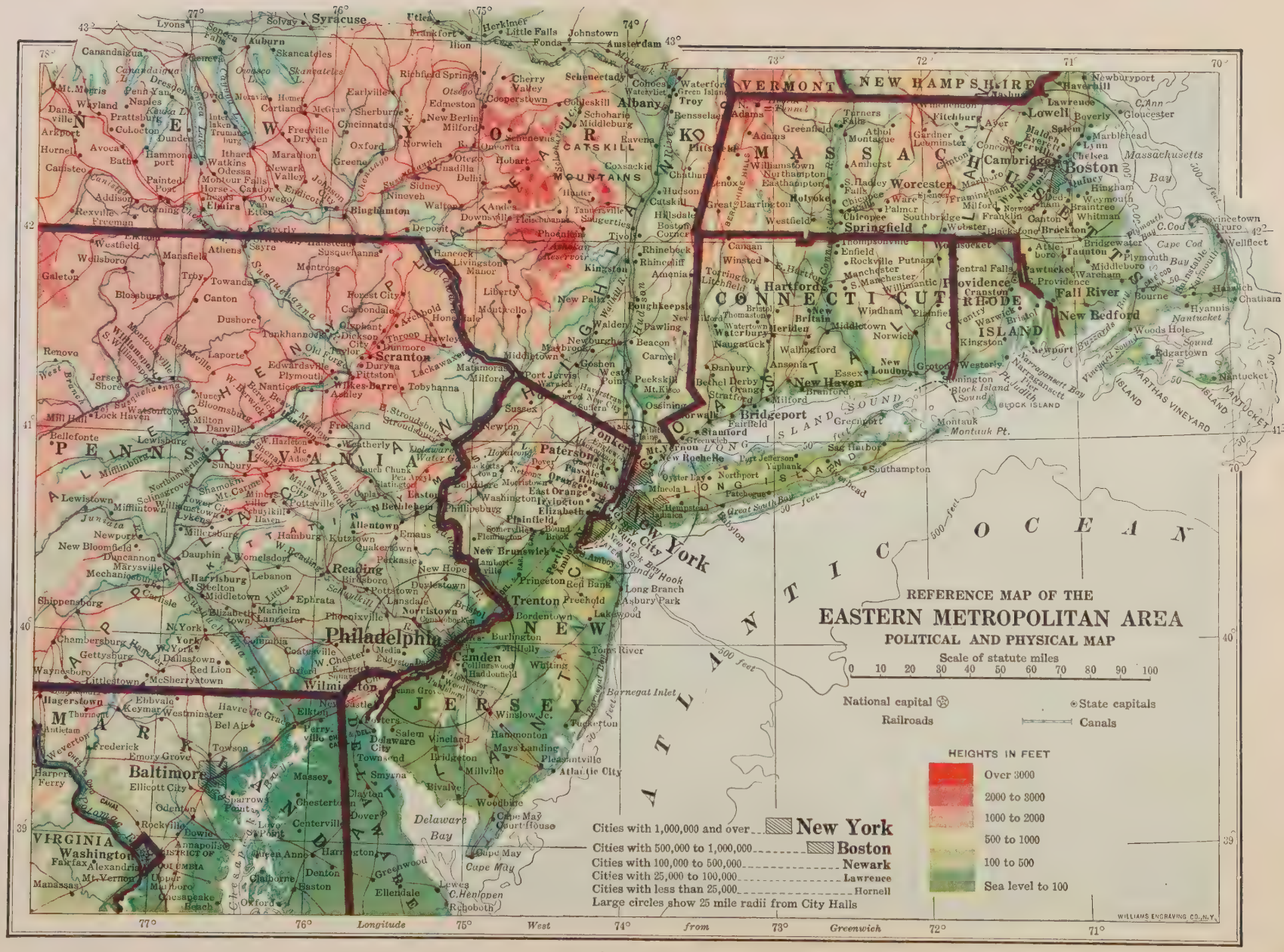
REFERENCE MAP OF THE
EASTERN METROPOLITAN AREA
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 10 20 30 40 50 60 70 80 90 100
National capital
State capitals
Railroads
Canals
HEIGHTS IN FEET
Over 3000
2000 to 3000
1000 to 2000
500 to 1000
100 to 500
Sea level to 100
Cities with 1,000,000 and over New York
Cities with 500,000 to 1,000,000 Boston
Cities with 100,000 to 500,000 Newark
Cities with 25,000 to 100,000 Lawrence
Cities with less than 25,000 Hornell
Large circles show 25 mile radii from City Halls
ATLANTIC OCEAN
Longitude West from Greenwich
WILLIAMS ENGRAVING CO., N.Y.

Fig. 500

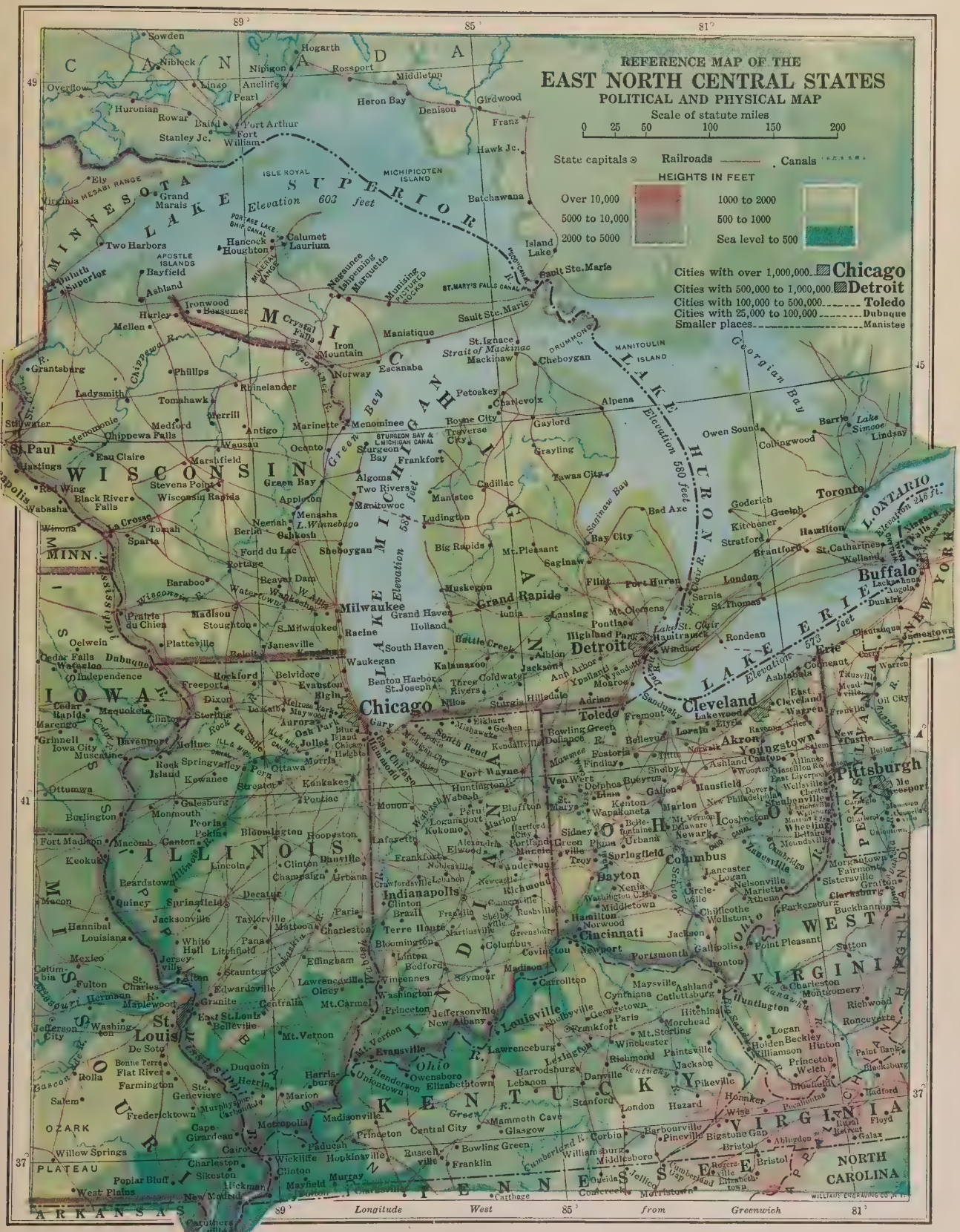
REFERENCE MAP OF THE
EAST NORTH CENTRAL STATES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 25 50 100 150 200
State capitals ⊙ Railroads ——— Canals
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Cities with over 1,000,000 Chicago
Cities with 500,000 to 1,000,000 Detroit
Cities with 100,000 to 500,000 Toledo
Cities with 25,000 to 100,000 Dubuque
Smaller places Manistee
Longitude West from Greenwich
WILLIAMS ENGRAVING CO. N.Y.

Fig. 501

	Area in Square Miles	Population
Australia, New Zealand, and Larger Islands of the Pacific		
Australia, 1919	**2,974,600**	**5,141,000**
Federal Territory	900	6,000
Northern Territory	523,600	5,000
New South Wales	309,400	1,963,000
Queensland	670,500	713,000
South Australia	380,100	456,000
Tasmania	26,200	211,000
Victoria	87,900	1,467,000
West Australia	975,900	323,000
Bismarck Archipelago, 1913	20,000	188,000
Fiji Islands, 1918	7,100	163,000
Guam, 1920	225	13,000
Hawaiian Islands, 1920	6,450	256,000
New Caledonia, 1911	7,700	51,000
New Guinea, 1919	312,300	950,000
British	116,500	750,000
Dutch	151,800	200,000
New Hebrides, 1911	5,100	70,000
New Zealand, 1919	105,000	1,139,000
Samoan Islands	1,300	49,000
American Samoa, 1920	102	8,000
Western Samoa, 1917	1,200	41,000
Solomon Islands, 1919	15,200	195,000
Tonga (Friendly) Islands, 1917	385	24,000
Africa	**11,600,000**	**142,000,000**
Belgian Sphere of Influence		
Belgian Kongo, 1919	929,000	15,500,000*
British Sphere of Influence		
Anglo-Egyptian Sudan, 1917	1,014,000	3,400,000*
Basutoland, 1911	11,700	405,000
Bechuanaland, 1911	275,000	125,000
British East Africa	723,300	13,837,000*
East African Protectorate, 1919	246,800	2,807,000*
Tanganyika Territory, 1919	365,200	7,500,000*
Uganda Territory, 1919	110,300	3,318,000
Zanzibar (Island), 1910	600	114,000
Pemba (Island), 1910	400	83,000
British Somaliland, 1911	68,000	300,000*
British West Africa	447,500	19,862,000
Gambia, 1918	4,500	208,000*
Gold Coast, 1911	80,000	1,503,000
Nigeria, 1918	332,000*	16,750,000
Sierra Leone, 1911	31,000	1,403,000
Egypt, 1917	350,000	12,751,000
Kamerun (British and French), 1919	191,100	2,540,000*
Nyasaland, 1918	39,600	1,218,000
Rhodesia	440,000	1,699,000
Northern Rhodesia, 1918	291,000	892,000
Southern Rhodesia, 1918	149,000	807,000
Southwest Africa, 1913	322,300	120,000
Swaziland, 1911	6,700	100,000
Togoland (British and French), 1913	36,700	1,032,000*
Union of South Africa, 1911	473,200	5,973,000
Cape of Good Hope, 1911	277,000	2,565,000
Natal, 1911	35,300	1,194,000
Orange Free State, 1911	50,400	528,000
Transvaal, 1911	110,500	1,686,000
French Sphere of Influence		
Algeria, 1911	222,200	5,564,000
French Equatorial Africa, 1915	672,000	9,000,000*
French Somali Coast, 1917	5,800	206,000*
French West Africa and Sahara	2,807,000	12,720,000
Dahomey, 1918	58,000	900,000
French Guinea, 1917	93,000	1,813,000
French Sahara, 1917	1,544,000	800,000
Ivory Coast, 1917	125,000	1,563,000
Mauritania, 1917	345,000	600,000
Senegal, 1917	74,000	1,445,000
Upper Senegal-Niger, 1917	473,000	5,599,000
Colony of the Upper Volta, 1917	95,000	
Kamerun (See British)		
Madagascar, 1917	228,000	3,545,000
Morocco, 1917	221,000	5,400,000
Togoland (See British)		
Tunis, 1914	50,000	1,940,000*
Italian Sphere of Influence		
Eritrea, 1915	45,800*	450,000*
Italian Somaliland, 1915	139,400	650,000*
Libia, 1915	406,000*	528,000
Portuguese Sphere of Influence		
Angola (Portuguese West Africa, 1918)	485,000	4,119,000
Mozambique (Port. East Africa, 1918)	428,100	3,012,000*
Portuguese Guinea, 1917	13,900	289,000*
Spanish Sphere of Influence		
Rio de Oro, 1918	70,000	12,000
Spanish Guinea, 1917	9,500	200,000*
Spanish Morocco, 1917	11,000	600,000*
Independent Countries		
Abyssinia, 1918	350,000	8,000,000*
Liberia, 1918	40,000*	2,000,000*
Antarctic Continent	**5,000,000**	

TWENTY-FIVE LARGEST CITIES IN THE WORLD

	Population
1. New York, U. S. 1920	5,621,000
2. London, England 1919	4,358,000
3. Paris, France 1911	2,888,000
4. Chicago, U. S. 1920	2,702,000
5. Petrograd, Russia 1915	2,319,000
6. Tokyo, Japan 1920	2,173,000
7. Berlin, Germany 1919	1,898,000
8. Vienna, Austria 1920	1,839,000
9. Philadelphia, U. S. 1920	1,823,000
10. Moscow, Russia 1915	1,817,000
11. Buenos Aires, Argentina 1918	1,637,000
12. Hankow, China 1918	1,444,000
13. Osaka, Japan 1920	1,253,000
14. Calcutta, India 1911	1,222,000
15. Rio de Janeiro, Brazil 1911	1,128,000
16. Glasgow, Scotland 1918	1,111,000
17. Mexico City, Mexico 1910	1,080,000
18. Constantinople, Turkey 1920	1,000,000
19. Peking, China 1918	1,000,000
20. Shanghai, China 1918	1,000,000
21. Detroit, U. S. 1920	994,000
22. Bombay, India 1911	979,000
23. Hamburg, Germany 1910	931,000
24. Canton, China 1916	900,000
25. Budapest, Hungary 1910	880,000

UNITED STATES AND POSSESSIONS

State	Area in Square Miles	Population 1910	Population 1920
Alabama	52,000	2,138,000	2,348,000
Arizona	114,000	204,000	334,000
Arkansas	53,300	1,574,000	1,752,000
California	158,300	2,378,000	3,427,000
Colorado	103,900	799,000	940,000
Connecticut	5,000	1,115,000	1,381,000
Delaware	2,400	202,000	223,000
District of Columbia	70	331,000	438,000
Florida	58,700	753,000	968,000
Georgia	59,300	2,609,000	2,896,000
Idaho	83,900	326,000	432,000
Illinois	56,700	5,639,000	6,485,000
Indiana	36,400	2,701,000	2,930,000
Iowa	56,100	2,225,000	2,404,000
Kansas	82,200	1,691,000	1,769,000
Kentucky	40,600	2,290,000	2,417,000
Louisiana	48,500	1,656,000	1,799,000
Maine	33,000	742,000	768,000
Maryland	12,300	1,295,000	1,450,000
Massachusetts	8,300	3,366,000	3,852,000
Michigan	58,000	2,810,000	3,668,000
Minnesota	84,700	2,076,000	2,387,000
Mississippi	46,900	1,797,000	1,791,000
Missouri	69,400	3,293,000	3,404,000
Montana	147,200	376,000	549,000
Nebraska	77,500	1,192,000	1,296,000
Nevada	110,700	82,000	77,000
New Hampshire	9,300	431,000	443,000
New Jersey	8,200	2,537,000	3,156,000
New Mexico	122,600	327,000	360,000
New York	49,200	9,114,000	10,385,000
North Carolina	52,400	2,206,000	2,559,000
North Dakota	70,600	577,000	646,000
Ohio	41,000	4,767,000	5,759,000
Oklahoma	70,000	1,657,000	2,028,000
Oregon	96,700	673,000	783,000
Pennsylvania	45,100	7,665,000	8,720,000
Rhode Island	1,250	543,000	604,000
South Carolina	31,000	1,515,000	1,684,000
South Dakota	77,600	584,000	637,000
Tennessee	42,000	2,185,000	2,338,000
Texas	265,900	3,897,000	4,663,000

State	Area in Square Miles	Population 1910	Population 1920
Utah	85,000	373,000	449,000
Vermont	9,600	356,000	352,000
Virginia	42,600	2,062,000	2,309,000
Washington	69,100	1,142,000	1,357,000
West Virginia	24,200	1,221,000	1,464,000
Wisconsin	56,100	2,334,000	2,632,000
Wyoming	97,900	146,000	194,000
United States (continental)	**3,027,000**	**91,972,000**	**105,709,000**
Outlying Possessions		9,174,000	12,149,000
Alaska	590,900	64,000	55,000
American Samoa	102	7,000 (1912)	8,000
Guam	225	12,000	13,000
Hawaii	6,450	192,000	256,000
Military and naval service abroad		56,000	117,000
Panama Canal Zone	500	63,000 (1912)	23,000
Philippine Islands	115,000	7,635,000 (1903)	10,351,000 (1918)
Porto Rico	3,600	1,118,000	1,300,000
Virgin Islands of U. S.	130	27,000 (1911)	26,000 (1917)
Total United States	**3,743,907**	**101,147,000**	**117,858,000**

TWENTY-FIVE LARGEST CITIES IN THE UNITED STATES

	Population 1910		Population 1920
1. New York	4,767,000	(1)	5,621,000
2. Chicago, Ill	2,185,000	(2)	2,702,000
3. Philadelphia, Pa	1,549,000	(3)	1,823,000
4. Detroit, Mich	466,000	(9)	994,000
5. Cleveland, Ohio	561,000	(6)	797,000
6. St. Louis, Mo	687,000	(4)	773,000
7. Boston, Mass	671,000	(5)	748,000
8. Baltimore, Md	558,000	(7)	734,000
9. Pittsburgh, Pa	534,000	(8)	588,000
10. Los Angeles, Cal	319,000	(17)	569,000
11. San Francisco, Cal	417,000	(11)	508,000
12. Buffalo, N. Y	424,000	(10)	507,000
13. Milwaukee, Wis	374,000	(12)	457,000
14. Washington, D. C	331,000	(16)	438,000
15. Newark, N. J	347,000	(14)	414,000
16. Cincinnati, Ohio	364,000	(13)	401,000
17. New Orleans, La	339,000	(15)	387,000
18. Minneapolis, Minn	301,000	(18)	381,000
19. Kansas City, Mo	248,000	(20)	324,000
20. Seattle, Wash	237,000	(21)	316,000
21. Indianapolis, Ind	234,000	(22)	314,000
22. Jersey City, N. J	268,000	(19)	298,000
23. Rochester, N. Y	218,000	(23)	296,000
24. Portland, Ore	207,000	(25)	258,000
25. Denver, Colo	213,000	(24)	256,000

GROWTH OF THE FIFTEEN LARGEST CITIES OF THE UNITED STATES

City	1800	1830	1890	1900	1910	1920
1. New York, N. Y	61,000 (1)	203,000 (1)	2,507,000 (1)	3,437,000 (1)	4,767,000 (1)	5,621,000
2. Chicago, Ill	———	4,000 (1840)	1,100,000 (2)	1,699,000 (2)	2,185,000 (2)	2,702,000
3. Philadelphia, Pa	41,000 (2)	80,000 (3)	1,047,000 (3)	1,294,000 (3)	1,549,000 (3)	1,823,000
4. Detroit, Mich	1,000 (1820)	2,000 (23)	206,000 (14)	286,000 (13)	466,000 (9)	994,000
5. Cleveland, Ohio	———	1,000 (24)	261,000 (10)	382,000 (8)	561,000 (6)	797,000
6. St. Louis, Mo	———	16,000 (1840)	452,000 (4)	575,000 (4)	687,000 (4)	773,000
7. Boston, Mass	25,000 (4)	61,000 (4)	448,000 (5)	561,000 (5)	671,000 (5)	748,000
8. Baltimore, Md	27,000 (3)	81,000 (2)	434,000 (6)	509,000 (6)	558,000 (7)	734,000
9. Pittsburgh, Pa	2,000 (10)	15,000 (11)	344,000 (7)	452,000 (7)	534,000 (8)	588,000
10. Los Angeles, Cal	———	———	50,000 (44)	102,000 (34)	319,000 (17)	569,000
11. San Francisco, Cal	———	———	209,000 (8)	343,000 (10)	417,000 (11)	508,000
12. Buffalo, N. Y	2,000 (1820)	9,000 (15)	256,000 (11)	352,000 (9)	424,000 (10)	507,000
13. Milwaukee, Wis	———	1,000 (1840)	204,000 (15)	285,000 (14)	374,000 (12)	457,000
14. Washington, D.C	———	19,000 (8)	230,000 (13)	279,000 (15)	331,000 (16)	438,000
15. Newark, N. J	8,000	11,000 (9)	182,000 (16)	246,000 (16)	347,000 (14)	414,000

CITIES OF THE UNITED STATES HAVING A POPULATION OF 25,000 OR OVER, INCLUDING THE CAPITAL AND LARGEST CITY OF EACH STATE

	Population 1910	Population 1920
Akron, Ohio	69,000	208,000
Alameda, Cal	23,000	29,000
Albany, N. Y	100,000	113,000
Albuquerque, N. M	11,000	15,000
Allentown, Pa	52,000	74,000
Altoona, Pa	52,000	60,000
Amsterdam, N. Y	31,000	34,000
Anderson, Ind	22,000	30,000
Annapolis, Md	9,000	11,000
Asheville, N. C	19,000	29,000
Atlanta, Ga	155,000	201,000
Atlantic City, N. J	46,000	51,000
Auburn, N. Y	35,000	36,000
Augusta, Ga	41,000	53,000
Augusta, Me	13,000	14,000
Aurora, Ill	30,000	36,000
Austin, Tex	30,000	35,000
Baltimore, Md	558,000	734,000
Bangor, Me	25,000	26,000
Baton Rouge, La	15,000	22,000
Battle Creek, Mich	25,000	36,000
Bay City, Mich	45,000	48,000
Bayonne, N. J	56,000	77,000
Beaumont, Tex	21,000	40,000
Bellingham, Wash	24,000	26,000
Berkeley, Cal	40,000	56,000
Bethlehem, Pa	13,000	50,000
Binghamton, N. Y	48,000	67,000
Birmingham, Ala	133,000	178,000
Bismarck, N. D	5,000	7,000
Bloomington, Ill	26,000	29,000
Boise, Idaho	17,000	21,000
Boston, Mass	671,000	748,000
Bridgeport, Conn	102,000	144,000
Brockton, Mass	57,000	66,000
Brookline, Mass	28,000	38,000
Buffalo, N. Y	424,000	507,000
Burlington, Vt	20,000	23,000
Butte, Mont	39,000	42,000
Cambridge, Mass	105,000	110,000
Camden, N. J	95,000	116,000
Canton, Ohio	50,000	87,000
Carson City, Nev	2,000	2,000
Cedar Rapids, Iowa	33,000	46,000
Charleston, S. C	59,000	68,000
Charleston, W. Va	23,000	40,000
Charlotte, N. C	34,000	46,000
Chattanooga, Tenn	45,000	58,000
Chelsea, Mass	32,000	43,000
Chester, Pa	39,000	58,000
Cheyenne, Wyo	11,000	14,000
Chicago, Ill	2,185,000	2,702,000
Chicopee, Mass	25,000	36,000
Cicero, Ill	15,000	45,000
Cincinnati, Ohio	364,000	401,000
Clarksburg, W. Va	9,000	28,000
Cleveland, Ohio	561,000	797,000
Clifton, N. J	12,000	26,000
Colorado Springs, Colo	29,000	30,000
Columbia, S. C	26,000	38,000
Columbus, Ga	21,000	31,000
Columbus, Ohio	182,000	237,000
Concord, N. H	21,000	22,000
Council Bluffs, Iowa	29,000	36,000
Covington, Ky	53,000	57,000
Cranston, R. I	21,000	29,000
Cumberland, Md	22,000	30,000
Dallas, Tex	92,000	159,000
Danville, Ill	28,000	34,000
Davenport, Iowa	43,000	57,000
Dayton, Ohio	117,000	153,000
Decatur, Ill	31,000	44,000
Denver, Colo	213,000	256,000
Des Moines, Iowa	86,000	126,000
Detroit, Mich	466,000	994,000
Dover, Del	4,000	4,000
Dubuque, Iowa	38,000	39,000
Duluth, Minn	78,000	99,000
East Chicago, Ind	19,000	36,000
East Cleveland, Ohio	9,000	27,000
Easton, Pa	29,000	34,000
East Orange, N. J	34,000	51,000
East St. Louis, Ill	59,000	67,000
Elgin, Ill	26,000	27,000
Elizabeth, N. J	73,000	96,000
Elmira, N. Y	37,000	45,000
El Paso, Tex	39,000	78,000
Erie, Pa	67,000	93,000
Evanston, Ill	25,000	37,000
Evansville, Ind	70,000	85,000
Everett, Mass	33,000	40,000
Everett, Wash	25,000	28,000
Fall River, Mass	119,000	120,000
Fargo, N. D	14,000	22,000
Fitchburg, Mass	38,000	41,000
Flint, Mich	39,000	92,000
Fort Smith, Ark	24,000	29,000
Fort Wayne, Ind	64,000	87,000

Cities with over 1,000,000 ..... London
Cities with 500,000 to 1,000,000 ..... Glasgow
Cities with 100,000 to 500,000 ..... Sheffield
Other places ..... Galway
ATLANTIC OCEAN
NORTH SEA
ENGLISH CHANNEL
BAY OF BISCAY
IRISH SEA
SCOTLAND
IRELAND
ENGLAND
FRANCE
SPAIN
PORTUGAL
BELGIUM
NETHERLANDS
SWITZERLAND
MEDITERRANEAN SEA
CORSICA (Fr.)
SHETLAND ISLANDS (To Scotland)
ORKNEY IS.
HEBRIDES ISLANDS
SCILLY IS.
CHANNEL ISLANDS (Br.)
ISLE OF WIGHT
ANDORRA
Longitude West 5° from Greenwich
London
Glasgow
Sheffield
Galway
Paris
Marseille
Lyon
Amsterdam
Rotterdam
Brussels
Cologne
Frankfurt
Hamburg
Berlin
Milan
Turin
Genoa
Naples
Rome
Vienna
Prague
Munich
Stuttgart
Zurich
Geneva
Basel
Lucerne
Bern
Lausanne
Strasbourg
Nancy
Metz
Lille
Calais
Dover
Brighton
Southampton
Plymouth
Bristol
Liverpool
Manchester
Leeds
Sheffield
Birmingham
Nottingham
Newcastle
Edinburgh
Glasgow
Belfast
Dublin
Cork
Limerick
Galway
Aberdeen
Inverness
Dundee
Perth
Stirling
Carlisle
Bordeaux
Toulouse
Nice
Cannes
Monaco
Lisbon
Madrid
Barcelona
Valencia
Seville
Gibraltar
Bilbao
San Sebastian
Santander
Corunna
Oporto
Coimbra
Lisbon
Cape St. Vincent
Cape Finisterre
Cape Clear
Land's End
Lizard
Start Point
Portland Bill
Beachy Head
North Foreland
Dungeness
Cape Gris-Nez
Ushant
Belle Ile
Quiberon
Brest
Cherbourg
Le Havre
Dieppe
Boulogne
Ostend
Antwerp
Ghent
Bruges
Dunkirk
Calais
Rotterdam
The Hague
Amsterdam
Utrecht
Arnhem
Nijmegen
Groningen
Leeuwarden
Helder
Harlingen
Den Helder
Texel
Vlieland
Terschelling
Ameland
Schiermonnikoog
Borkum
Norderney
Juist
Baltrum
Langeoog
Spiekeroog
Wangerooge
Helgoland
Sylt
Amrum
Föhr
Pellworm
Nordstrand
Hallig Hooge
Hallig Langeness
Hallig Oland
Hallig Gröde
Hallig Nordmarsch-Langeness
Hallig Südmarsch-Langeness
Hallig Habel
Hallig Norderoog
Hallig Süderoog
Hallig Südfall
Hallig Nordfall
Hallig Oland
Hallig Gröde
Hallig Hooge
Hallig Langeness
Hallig Nordmarsch-Langeness
Hallig Südmarsch-Langeness
Hallig Habel
Hallig Norderoog
Hallig Süderoog
Hallig Südfall
Hallig Nordfall
Fig. 502

REFERENCE MAP OF
NORTHWESTERN EUROPE
PHYSICAL AND POLITICAL MAP
Scale of statute miles
0 50 100 200 300
Railroads
Canals
Capitals of countries
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Below sea level
WILLIAMS ENGRAVING CO., N.Y.
Longitude East from Greenwich
GULF OF BOTHNIA
GULF OF FINLAND
GULF OF RIGA
BALTIC SEA
FINLAND
ESTHONIA
LATVIA
LITHUANIA
RUSSIA
SWEDEN
NORWAY
DENMARK
GERMANY
POLAND
CZECHOSLOVAKIA
AUSTRIA
HUNGARY
RUMANIA
YUGOSLAVIA
BULGARIA
UKRAINE
BLACK SEA
ADRIATIC SEA
Petrograd
Moscow
Riga
Berlin
Warsaw
Prague
Vienna
Budapest
Kief
Odessa
Constantza
Stockholm
Helsingfors
Reval
Kronstadt
Narva
Pskof
Ostrof
Dorpat
Libau
Memel
Konigsberg
Vilna
Minsk
Grodno
Brest-Litovsk
Pinsk
Lemberg
Przemysl
Cracow
Lodz
Breslau
Dresden
Leipzig
Hamburg
Stettin
Danzig
Lubeck
Copenhagen
Malmo
Gothenburg
Christiania
Bergen
Trondhjem
Aberdeen
Edinburgh
Glasgow
Belfast
Dublin
London
Liverpool
Manchester
Birmingham
Cardiff
Bristol
Plymouth
Southampton
Portsmouth
Dover
Calais
Boulogne
Paris
Rouen
Le Havre
Caen
Cherbourg
Brest
Nantes
Bordeaux
Toulouse
Marseilles
Nice
Lyons
Geneva
Basel
Strassburg
Metz
Nancy
Verdun
Reims
Amiens
Lille
Ostend
Antwerp
Brussels
Ghent
Bruges
Ostend
Rotterdam
The Hague
Amsterdam
Utrecht
Arnhem
Nijmegen
Groningen
Leeuwarden
Zwolle
Enschede
Hengelo
Deventer
Apeldoorn
Amersfoort
Haarlem
Leiden
Delft
Dordrecht
Middelburg
Flushing
Terneuzen
Ghent
Bruges
Ostend
Zeebrugge
Dunkirk
Calais
Boulogne
Le Havre
Caen
Cherbourg
Brest
Nantes
Bordeaux
Toulouse
Marseilles
Nice
Lyons
Geneva
Basel
Strassburg
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Verdun
Reims
Amiens
Lille
Ostend
Antwerp
Brussels
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Bruges
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Groningen
Leeuwarden
Zwolle
Enschede
Hengelo
Deventer
Apeldoorn
Amersfoort
Haarlem
Leiden
Delft
Dordrecht
Middelburg
Flushing
Terneuzen

Fig. 502

	Population 1910	Population 1920
Fort Worth, Tex.	73,000	106,000
Frankfort, Ky.	10,000	10,000
Fresno, Cal.	25,000	45,000
Galveston, Tex.	37,000	44,000
Gary, Ind.	17,000	55,000
Grand Rapids, Mich.	113,000	138,000
Green Bay, Wis.	25,000	31,000
Hagerstown, Md.	17,000	28,000
Hamilton, Ohio.	35,000	40,000
Hammond, Ind.	21,000	36,000
Hamtramck, Mich.	4,000	49,000
Harrisburg, Pa.	64,000	76,000
Hartford, Conn.	99,000	138,000
Haverhill, Mass.	44,000	54,000
Hazleton, Pa.	25,000	32,000
Helena, Mont.	13,000	12,000
Highland Park, Mich.	4,000	46,000
Hoboken, N. J.	70,000	68,000
Holyoke, Mass.	58,000	60,000
Honolulu, Hawaii	52,000	83,000
Houston, Tex.	79,000	138,000
Huntington, W. Va.	31,000	50,000
Indianapolis, Ind.	234,000	314,000
Irvington, N. J.	12,000	25,000
Jackson, Mich.	31,000	48,000
Jackson, Miss.	21,000	23,000
Jacksonville, Fla.	58,000	92,000
Jamestown, N. Y.	31,000	39,000
Jefferson City, Mo.	12,000	14,000
Jersey City, N. J.	268,000	298,000
Johnstown, Pa.	55,000	67,000
Joliet, Ill.	35,000	38,000
Joplin, Mo.	32,000	30,000
Juneau, Alaska	2,000	3,000
Kalamazoo, Mich.	39,000	49,000
Kansas City, Kan.	82,000	101,000
Kansas City, Mo.	248,000	324,000
Kearny, N. J.	19,000	27,000
Kenosha, Wis.	21,000	40,000
Kingston, N. Y.	26,000	27,000
Knoxville, Tenn.	36,000	78,000
Kokomo, Ind.	17,000	30,000
La Crosse, Wis.	30,000	30,000
Lakewood, Ohio.	15,000	42,000
Lancaster, Pa.	47,000	53,000
Lansing, Mich.	31,000	57,000
Lawrence, Mass.	86,000	94,000
Lewiston, Me.	26,000	32,000
Lexington, Ky.	35,000	42,000
Lima, Ohio.	31,000	41,000
Lincoln, Neb.	44,000	55,000
Little Rock, Ark.	46,000	65,000
Long Beach, Cal.	18,000	56,000
Lorain, Ohio.	29,000	37,000
Los Angeles, Cal.	319,000	569,000
Louisville, Ky.	224,000	235,000
Lowell, Mass.	106,000	113,000
Lynchburg, Va.	29,000	30,000
Lynn, Mass.	89,000	99,000
McKeesport, Pa.	43,000	46,000
Macon, Ga.	41,000	53,000
Madison, Wis.	26,000	38,000
Malden, Mass.	44,000	49,000
Manchester, N. H.	70,000	78,000
Manila, P. I.	234,000	284,000
Mansfield, Ohio.	21,000	28,000
Marion, Ohio.	18,000	28,000
Medford, Mass.	23,000	39,000
Memphis, Tenn.	131,000	162,000
Meriden, Conn.	32,000	35,000
Meridian, Miss.	23,000	23,000
Miami, Fla.	5,000	30,000
Milwaukee, Wis.	374,000	457,000
Minneapolis, Minn.	301,000	381,000
Mobile, Ala.	52,000	60,000
Moline, Ill.	24,000	31,000
Montclair, N. J.	22,000	29,000
Montgomery, Ala.	38,000	43,000
Montpelier, Vt.	8,000	7,000
Mount Vernon, N. Y.	31,000	43,000
Muncie, Ind.	24,000	37,000
Muskegon, Mich.	24,000	37,000
Muskogee, Okla.	25,000	30,000
Nashua, N. H.	26,000	28,000
Nashville, Tenn.	110,000	118,000
Newark, N. J.	347,000	414,000
Newark, Ohio.	25,000	27,000
New Bedford, Mass.	97,000	121,000
New Britain, Conn.	44,000	59,000
New Brunswick, N. J.	23,000	33,000
Newburgh, N. Y.	28,000	30,000
New Castle, Pa.	36,000	45,000
New Haven, Conn.	134,000	163,000
New London, Conn.	20,000	26,000
New Orleans, La.	339,000	387,000
Newport, Ky.	30,000	29,000
Newport, R. I.	27,000	30,000
Newport News, Va.	20,000	36,000
New Rochelle, N. Y.	29,000	36,000
Newton, Mass.	40,000	46,000
New York, N. Y.	4,767,000	5,621,000
Niagara Falls, N. Y.	30,000	51,000
Norfolk, Va.	67,000	116,000
Norristown, Pa.	28,000	32,000
Norwalk, Conn.	24,000	28,000
Norwich, Conn.	28,000	30,000
Oakland, Cal.	150,000	216,000
Oak Park, Ill.	19,000	40,000
Ogden, Utah.	26,000	33,000
Oklahoma City, Okla.	64,000	91,000
Olympia, Wash.	7,000	9,000
Omaha, Neb.	124,000	193,000
Orange, N. J.	30,000	33,000
Oshkosh, Wis.	33,000	33,000
Pasadena, Cal.	30,000	45,000
Passaic, N. J.	55,000	64,000
Paterson, N. J.	126,000	136,000
Pawtucket, R. I.	52,000	64,000
Pensacola, Fla.	23,000	31,000
Peoria, Ill.	67,000	76,000
Perth Amboy, N. J.	32,000	42,000
Petersburg, Va.	24,000	31,000
Philadelphia, Pa.	1,549,000	1,823,000
Phoenix, Ariz.	11,000	29,000
Pierre, S. D.	4,000	3,000
Pittsburgh, Pa.	534,000	588,000
Pittsfield, Mass.	32,000	42,000
Plainfield, N. J.	21,000	28,000
Pontiac, Mich.	15,000	34,000
Port Huron, Mich.	19,000	26,000
Portland, Me.	59,000	69,000
Portland, Ore.	207,000	258,000
Portsmouth, Ohio.	23,000	33,000
Portsmouth, Va.	33,000	54,000
Poughkeepsie, N. Y.	28,000	35,000
Providence, R. I.	224,000	238,000
Pueblo, Colo.	44,000	43,000
Quincy, Ill.	37,000	36,000
Quincy, Mass.	33,000	48,000
Racine, Wis.	38,000	59,000
Raleigh, N. C.	19,000	24,000
Reading, Pa.	96,000	108,000
Revere, Mass.	18,000	29,000
Reno, Nev.	11,000	12,000
Richmond, Ind.	22,000	27,000
Richmond, Va.	128,000	172,000
Roanoke, Va.	35,000	51,000
Rochester, N. Y.	218,000	296,000
Rockford, Ill.	45,000	66,000
Rock Island, Ill.	24,000	35,000
Rome, N. Y.	20,000	26,000
Sacramento, Cal.	45,000	66,000
Saginaw, Mich.	51,000	62,000
St. Joseph, Mo.	77,000	78,000
St. Louis, Mo.	687,000	773,000
St. Paul, Minn.	215,000	235,000
St. Thomas, V. I.	———	8,000
Salem, Mass.	44,000	43,000
Salem, Ore.	14,000	18,000
Salt Lake City, Utah.	93,000	118,000
San Antonio, Tex.	97,000	161,000
San Diego, Cal.	40,000	75,000
San Francisco, Cal.	417,000	508,000
San José, Cal.	29,000	40,000
San Juan, P. R.	49,000	72,000
Santa Fé, N. M.	5,000	7,000
Savannah, Ga.	65,000	83,000
Schenectady, N. Y.	73,000	89,000
Scranton, Pa.	130,000	138,000
Seattle, Wash.	237,000	316,000
Sheboygan, Wis.	26,000	31,000
Shreveport, La.	28,000	44,000
Sioux City, Iowa.	48,000	71,000
Sioux Falls, S. D.	14,000	25,000
Somerville, Mass.	77,000	93,000
South Bend, Ind.	54,000	71,000
Spokane, Wash.	104,000	104,000
Springfield, Ill.	52,000	59,000
Springfield, Mass.	89,000	130,000
Springfield, Mo.	35,000	40,000
Springfield, Ohio.	47,000	61,000
Stamford, Conn.	29,000	40,000
Steubenville, Ohio.	22,000	29,000
Stockton, Cal.	23,000	40,000
Superior, Wis.	40,000	40,000
Syracuse, N. Y.	137,000	172,000
Tacoma, Wash.	84,000	97,000
Tallahassee, Fla.	5,000	6,000
Tampa, Fla.	38,000	51,000
Taunton, Mass.	34,000	37,000
Terre Haute, Ind.	58,000	66,000
Toledo, Ohio.	168,000	243,000
Topeka, Kan.	44,000	50,000
Trenton, N. J.	97,000	119,000
Troy, N. Y.	77,000	72,000
Tulsa, Okla.	18,000	72,000
Utica, N. Y.	74,000	94,000
Waco, Tex.	26,000	39,000
Waltham, Mass.	28,000	31,000
Warren, Ohio.	11,000	27,000
Washington, D. C.	331,000	438,000
Waterbury, Conn.	73,000	91,000
Waterloo, Iowa.	27,000	36,000
Watertown, N. Y.	27,000	31,000
West Hoboken, N. J.	35,000	40,000
West New York, N. J.	14,000	30,000
Wheeling, W. Va.	42,000	54,000
Wichita, Kan.	52,000	72,000
Wichita Falls, Tex.	8,000	40,000
Wilkes-Barre, Pa.	67,000	74,000
Wilmington, Del.	87,000	110,000
Wilmington, N. C.	26,000	33,000
Williamsport, Pa.	32,000	36,000
Winston-Salem, N. C.	23,000	48,000
Woonsocket, R. I.	38,000	43,000
Worcester, Mass.	146,000	180,000
Yonkers, N. Y.	80,000	100,000
York, Pa.	45,000	48,000
Youngstown, Ohio.	79,000	132,000
Zanesville, Ohio.	28,000	30,000

FOREIGN CITIES

		Population
Aberdeen, Scotland	1918	167,000
Adelaide, Australia	1918	236,000
Adis Abeba, Abyssinia	1920	45,000
Aleppo, Syria	1920	250,000
Alexandria, Egypt	1917	445,000
Algiers, Algeria	1912	172,000
Amiens, France	1911	93,000
Amsterdam, The Netherlands	1918	644,000
Antwerp, Belgium	1917	310,000
Archangel, Russia	1913	44,000
Arequipa, Peru	1908	40,000
Astrakhan, Russia	1913	164,000
Asuncion, Paraguay	1919	102,000
Athens, Greece	1907	200,000
Auckland, New Zealand	1916	134,000

		Population
Bagdad, Mesopotamia	1920	250,000
Bahia, Brazil	1913	348,000
Bahia Blanca, Argentina	1914	44,000
Baku, Azerbaijan	1920	250,000
Bangkok, Siam	1914	541,000
Barcelona, Spain	1918	619,000
Barranquilla, Colombia	1918	65,000
Basel, Switzerland	1919	136,000
Batavia, Java	1917	235,000
Beirut, Syria	1920	150,000
Belfast, Ireland	1919	393,000
Belgrade, Jugo-Slavia	1911	91,000
Belize, British Honduras	1911	10,000
Benares, India	1911	204,000
Berlin, Germany	1919	1,898,000
Birmingham, England	1919	862,000
Bogota, Colombia	1918	138,000
Bokhara, Bokhara	1920	75,000*
Bombay, India	1911	979,000
Bordeaux, France	1911	262,000
Boulogne, France	1911	57,000
Bradford, England	1919	283,000
Bremen, Germany	1910	247,000
Breslau, Germany	1910	512,000
Brest, France	1911	91,000
Brisbane, Australia	1918	181,000*
Bristol, England	1919	362,000
Bruges, Belgium	1917	53,000
Brussa, Turkey	1920	110,000
Brussels, Belgium	1917	679,000
Bucharest, Rumania	1917	309,000
Budapest, Hungary	1910	880,000
Buenos Aires, Argentina	1918	1,637,000
Cadiz, Spain	1918	65,000
Cairo, Egypt	1917	791,000
Calcutta, India	1911	1,222,000
Calgary, Canada	1916	57,000
Callao, Peru	1905	34,000
Cambridge, England	1919	58,000
Canton, China	1918	900,000
Cape Town, Union of S. Africa	1918	100,000
Caracas, Venezuela	1915	87,000
Cardiff, Wales	1919	204,000
Charleroi, Belgium	1917	29,000
Charlottenburg, Germany	1910	306,000
Charlottetown, Prince Edward Island	1911	11,000
Chemnitz, Germany	1910	288,000
Cholon, French Indo-China	1915	168,000
Christiania, Norway	1918	259,000
Cologne, Germany	1910	517,000
Colombo, Ceylon	1911	211,000
Colon, Panama	1917	26,000
Constantinople, Turkey	1920	1,000,000*
Copenhagen, Denmark	1916	506,000
Cordoba, Argentina	1918	156,000
Cordova, Spain	1918	73,000
Damascus, Syria	1920	250,000
Danzig, Free city	1919	200,000
Dawson, Canada	1911	3,000
Delft, The Netherlands	1918	38,000*
Delhi, India	1911	233,000
Dortmund, Germany	1916	282,000
Dresden, Germany	1910	548,000
Dublin, Ireland	1919	399,000
Duisburg, Germany	1910	229,000
Düsseldorf, Germany	1910	359,000
Edinburgh, Scotland	1918	334,000
Edmonton, Canada	1916	54,000
Erivan, Armenia	1920	90,000
Erzerum, Armenia	1918	80,000
Essen, Germany	1916	464,000
Fez, Morocco	1918	106,000
Fiume, Free city	1910	50,000
Florence, Italy	1915	242,000
Foochow, China	1918	624,000
Frankfort, Germany	1910	415,000
Funchal, Madeira Islands	1911	25,000
Geneva, Switzerland	1919	141,000
Genoa, Italy	1915	300,000
Georgetown, British Guiana	1918	54,000
Ghent, Belgium	1917	164,000
Glasgow, Scotland	1918	1,111,000
Gothenburg, Sweden	1919	197,000
Guadalajara, Mexico	1910	119,000
Guatemala, Guatemala	1910	90,000
Guayaquil, Ecuador	1915	94,000
Hague, The, The Netherlands	1918	352,000
Halifax, Nova Scotia	1911	47,000
Hamburg, Germany	1910	931,000
Hamilton, Canada	1915	101,000
Hangchow, China	1918	684,000
Hankow, China	1918	1,444,000
Hanover, Germany	1910	302,000
Havana, Cuba	1919	361,000
Havre, France	1911	136,000
Helsingfors, Finland	1917	188,000
Hongkong, China	1911	366,000
Irkutsk, Siberia	1913	130,000
Jerusalem, Palestine	1919	60,000
Johannesburg, Union of S. Africa	1911	237,000
Kabul, Afghanistan	1920	150,000*
Khiva, Khiva	1920	5,000
Kief, Ukraine	1913	610,000
Kiel, Germany	1910	212,000
Kimberley, Union of S. Africa	1918	17,000
Kingston, Jamaica	1911	57,000
Kobe, Japan	1920	609,000
Königsberg, Germany	1910	246,000
Kyoto, Japan	1920	591,000
La Paz, Bolivia	1915	100,000
La Plata, Argentina	1914	90,000
Leeds, England	1919	431,000
Leghorn, Italy	1915	109,000
Leicester, England	1919	236,000
Leipzig, Germany	1910	590,000
Leon, Nicaragua	1917	74,000
Liège, Belgium	1917	170,000
Lille, France	1911	218,000
Lima, Peru	1913	144,000
Limoges, France	1911	93,000
Lisbon, Portugal	1911	435,000
Liverpool, England	1919	773,000
Lodz, Poland	1910	424,000
London, England	1919	4,358,000
Louvain, Belgium	1917	41,000
Lucknow, India	1911	260,000
Luxembourg, Luxembourg	1916	20,000
Lyon, France	1911	524,000
Madras, India	1911	519,000
Madrid, Spain	1918	652,000
Magdeburg, Germany	1910	280,000
Malaga, Spain	1918	141,000
Manaos, Brazil	1913	81,000
Manchester, England	1919	741,000
Mandalay, Burma	1911	138,000
Marseille, France	1911	551,000
Mekka, Hejaz	1919	80,000*
Mechlin, Belgium	1917	59,000
Medina, Hejaz	1920	40,000
Melbourne, Australia	1918	724,000
Metz, France	1911	69,000
Mexico City, Mexico	1910	1,080,000
Milan, Italy	1915	663,000
Mombasa, British East Africa	1920	30,000
Mons, Belgium	1917	27,000
Montevideo, Uruguay	1919	361,000
Montreal, Canada	1917	700,000
Moscow, Russia	1915	1,817,000
Mozambique, Mozambique	1910	363,000
Munich, Germany	1910	596,000
Nagasaki, Japan	1920	177,000
Nagoya, Japan	1920	430,000
Nancy, France	1911	120,000
Nantes, France	1911	171,000
Naples, Italy	1915	698,000
Nassau, Bahama Islands	1911	14,000
Nice, France	1911	143,000
Ningpo, China	1918	670,000
Nish, Jugo-Slavia	1910	25,000
Nuremberg, Germany	1910	333,000
Odessa, Ukraine	1912	631,000
Omsk, The Steppes	1913	136,000
Oporto, Portugal	1911	194,000
Osaka, Japan	1920	1,253,000
Ostend, Belgium	1917	43,000
Ottawa, Canada	1915	102,000
Oxford, England	1919	58,000
Palermo, Sicily	1915	346,000
Panama, Panama	1917	61,000
Para (Belem), Brazil	1913	275,000
Paramaribo, Dutch Guiana	1919	37,000
Paris, France	1911	2,888,000
Peking, China	1918	1,000,000
Pernambuco, Brazil	1913	216,000
Petrograd, Russia	1915	2,319,000
Piraeus, Greece	1907	74,000
Plymouth, England	1919	182,000
Port au Prince, Haiti	1912	120,000
Port of Spain, Trinidad	1918	68,000
Port Said, Egypt	1917	91,000
Portsmouth, England	1919	225,000
Posen, Poland	1910	157,000
Prague, Czecho-Slovakia	1910	617,000
Puebla, Mexico	1910	96,000
Quebec, Canada	1917	103,000
Quito, Ecuador	1915	70,000
Rangoon, Burma	1911	294,000
Regina, Canada	1919	40,000
Reims, France	1911	115,000
Reval, Esthonia	1917	160,000
Riga, Latvia	1913	569,000
Rio de Janeiro, Brazil	1911	1,128,000
Rome, Italy	1915	591,000
Rosario, Argentina	1914	223,000
Rotterdam, The Netherlands	1918	501,000
Rouen, France	1911	125,000
St. Etienne, France	1911	149,000
St. John, Canada	1911	43,000
St. Johns, Newfoundland	1918	34,000
Saloniki, Greece	1919	250,000
San José, Costa Rica	1918	52,000
San Luis Potosi, Mexico	1910	68,000
San Salvador, Salvador	1919	66,000
Santa Fé, Argentina	1914	60,000
Santiago, Chile	1918	416,000
Santo Domingo, Dominican Republic	1919	27,000
Sao Paulo, Brazil	1913	450,000
Scutari, Albania	1920	32,000
Seoul, Chosen	1920	302,686
Shanghai, China	1918	1,000,000
Sheffield, England	1919	474,000
Singapore, Straits Settlements	1911	260,000
Smyrna, Asia Minor	1918	375,000
Sofia, Bulgaria	1910	103,000
Soochow, China	1918	500,000
Southampton, England	1919	126,000
Stettin, Germany	1916	224,000
Stockholm, Sweden	1919	408,000
Strasbourg, France	1911	179,000
Stuttgart, Germany	1910	286,000
Sucre, Bolivia	1915	30,000
Sydney, Australia	1918	793,000
Sydney, Nova Scotia	1911	18,000
Tananarive, Madagascar	1913	63,000
Tashkent, Russian Turkestan	1913	272,000
Tegucigalpa, Honduras	1914	29,000
Teheran, Persia	1920	220,000*
Tientsin, China	1918	800,000
Tiflis, Georgia	1915	347,000
Toblosk, Siberia	1913	25,000
Tokyo, Japan	1920	2,173,000
Tomsk, Siberia	1913	117,000
Toronto, Canada	1920	510,000
Toulouse, France	1911	150,000
Tournai, Belgium	1917	37,000
Trebizond, Turkey	1913	55,000
Trieste, Italy	1914	247,000
Tripoli, Libia	1911	73,000
Tunis, Tunis	1911	162,000
Turin, Italy	1915	452,000
Utrecht, The Netherlands	1918	137,000
Valdivia, Chile	1918	26,000
Valencia, Spain	1918	245,000
Valparaiso, Chile	1918	213,000
Vancouver, Canada	1919	175,000
Venice, Italy	1915	168,000
Vera Cruz, Mexico	1910	49,000
Vienna, Austria	1920	1,839,000
Vilna, Lithuania	1914	215,000
Vladivostok, Siberia	1911	91,000
Warsaw, Poland	1919	820,000
West Ham, England	1919	288,000
Winnipeg, Canada	1916	163,000
Yokohama, Japan	1920	423,000
Zurich, Switzerland	1919	212,000

HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
Below sea level
1000 to 2000
600 to 1000
Sea level to 500
Cities with over 500,000 ..... Marseille
Cities with 100,000 to 500,000 ..... Bordeaux
Other places ..... Bayonne
REFERENCE MAP OF THE
WESTERN MEDITERRANEAN COUNTRIES
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300
Railroads
Canals
Caravan routes
Capitals of countries
Longitude West from Greenwich
Longitude East from Greenwich
WILLIAMS ENGRAVING CO., N.Y.

Fig. 503

REFERENCE MAP OF THE
COUNTRIES OF THE
DANUBE AND THE BALKANS
POLITICAL AND PHYSICAL MAP
Scale of statute miles
0 50 100 200 300
Railroads
Capitals of countries
HEIGHTS IN FEET
Over 10,000
5000 to 10,000
2000 to 5000
1000 to 2000
500 to 1000
Sea level to 500
Cities with over 1,000,000 Constantinople
Cities with 500,000 to 1,000,000 Budapest
Cities with 100,000 to 500,000 Lemberg
Other places Brusa
Longitude East from Greenwich
WILLIAMS ENGRAVING CO., N.Y.
GERMANY
POLAND
CZECHOSLOVAKIA
AUSTRIA
HUNGARY
RUMANIA
YUGOSLAVIA
BULGARIA
UKRAINE
ASIATIC TURKEY
Prague
Vienna
Budapest
Constantinople
Lemberg
Brusa
Danube
Carpathian Mts.
Alps Mts.
Transylvanian Alps
Dinaric Alps
Adriatic Sea
Mediterranean Sea
Black Sea
Aegean Sea
Sea of Marmora
Dardanelles
Straits of Messina
Gulf of Corinth
Gulf of Salonika
Gulf of Saloniki
Gulf of Taranto
Gulf of Gallipoli
Gulf of Venice
Gulf of Squillace
Gulf of Arcadia
Gulf of Kalonkhi
Gulf of Koron
Gulf of Smyrna
Sea of Azov
Zone of the Straits
Turkey in Europe
Sicily
Crete
Rhodes
Cyclades
Sporades
Ionian Islands
Aegadian Is.
Lipari or Aeolian Is.
Balearic Is.
Malta I. (Br.)
Africa

Fig. 504

ELEVATION OF SOME PLATEAUS AND MOUNTAIN PEAKS

	Feet
Abyssinian Plateau	5–7,000
Aconcagua, Andes, Argentina (highest in South America)	22,860
Apo, Mindanao, Philippines	10,312
Ararat, Armenia	17,325
Mt. Blanc, Alps, France (highest in Alps)	15,781
Bolivian Plateau	10–13,000
Brazilian Plateau	2–2,500
Chimborazo, Andes, Ecuador	20,498
Cotopaxi, Andes, Ecuador	19,613
Elbruz, Caucasus, Russia (highest in Europe)	18,200
Etna, Sicily	10,835
Everest, Himalayas, Nepal (highest in the world)	29,002
Fujiyama, Japan	12,365
Hecla, Iceland	5,110
Kanchanjanga (Himalayas)	28,156
Kenia, Africa	18,620
Kilimanjaro, Africa (highest in Africa)	19,780
Kosciusko, Australia (highest in Australia)	7,336
Lassen, Sierra Nevada, Cal.	10,577
Logan, Coast Ranges, Canada (highest in Canada)	19,539
McKinley, Alaska (highest in North America)	20,300
Mauna Kea, Hawaiian Islands	13,805
Mauna Loa, Hawaiian Islands	13,675
Mayon, Luzon Island, Philippines	8,900
Mexican Plateau	5–6,000
Mitchell, Appalachian Mts., N. C. (highest in Eastern U. S.)	6,711
Mt. Marcy, New York	5,344
Mt. Tina, Haiti	10,300
Orizaba, Mexico (highest in Mexico)	18,314
Pico del Turquino, Cuba	8,600
Pike's Peak, Rocky Mountains, Colorado	14,111
Popocatepetl, Mexico	17,798
Rainier, Cascade Mountains, Washington	14,408
St. Elias, Alaska	18,025
San Francisco Mountain, Arizona	12,794
Shasta, Cascade Mountains, California	14,380
Tibet Plateau	10–15,000
United States, Western Plateau	4–6,000
Vesuvius, Italy	4,200
Washington, White Mountains, N. H. (highest in Northeastern U. S.)	6,279
Whitney, Sierra Nevada, California (highest in continental U. S.)	14,502
Yunque, Porto Rico	3,609

SOME OF THE LARGEST RIVERS OF THE WORLD

	Length in Miles	Basin Area Sq. Miles	Ocean
North America			
Arkansas	2,170	185,671	Atlantic
Colorado	2,000	225,049	Pacific
Columbia	1,400	216,537	Pacific
Mackenzie	2,000	590,000	Arctic
Missouri	3,000	527,155	Atlantic
Missouri-Mississippi	4,300	1,257,000	Atlantic
Nelson	1,732	432,000	Atlantic
Ohio	975	201,720	Atlantic
Rio Grande	1,800	240,000	Atlantic
St. Lawrence	2,200	530,000	Atlantic
Yukon	2,000	440,000	Pacific
South America			
Amazon	3,300	2,500,000	Atlantic
Orinoco	1,350	366,000	Atlantic
Plata	2,580	1,200,000	Atlantic
Sao Francisco	1,800	200,000	Atlantic
Europe			
Danube	1,770	300,000	Atlantic
Dnieper	1,200	242,000	Atlantic
Dwina	1,000	140,000	Arctic
Elbe	725	55,000	Atlantic
Po	400	27,000	Atlantic
Rhine	800	75,000	Atlantic
Rhone	500	38,000	Atlantic
Seine	482	30,300	Atlantic
Thames	228	6,100	Atlantic
Volga	2,400	563,300	Caspian
Asia			
Amur	2,800	520,000	Pacific
Brahmaputra	1,800	425,000	Indian
Ganges	1,500	440,000	Indian
Hwang	2,700	570,000	Pacific
Indus	1,800	372,700	Indian
Irrawaddy	1,500	158,000	Indian
Lena	2,800	950,000	Arctic
Mekong	2,800	280,000	Pacific
Ob	3,200	1,000,000	Arctic
Yangzte	3,200	548,000	Pacific
Yenisei	3,000	1,500,000	Arctic
Africa			
Kongo	2,900	1,200,000	Atlantic
Niger	2,600	563,300	Atlantic
Nile	3,400	1,273,000	Atlantic
Zambezi	1,500	600,000	Indian
Australia			
Darling	1,100	———	Indian
Murray	1,000	270,000	Indian

SOME OF THE LARGEST LAKES OF THE WORLD

	Area in Sq. Miles	Elevation in Feet	Greatest Depth in Feet
Aral Sea	26,900	160	225
Baikal	12,500	1,312	4,550
Balkash	7,800	780	70
Caspian	169,000	−85[1]	2,400
Chad, variable with season	10,000 and often more	800–900	12
Dead Sea	370	−1,310[1]	1,330
Erie	9,990	573	210
Great Bear Lake	11,200	200	———
Great Salt Lake	2,360	4,218	30–50
Great Slave Lake	10,100	———	over 650
Huron	22,322	582	750
Ladoga	7,000	60	730
Manitoba	1,850	810	———
Michigan	21,729	582	870
Nicaragua	3,600	110	83
Nyassa	14,000	1,500	600+
Ontario	7,104	247	738
Superior	30,829	602	1,008
Tanganyika	12,650	2,800	2,100
Titicaca	3,300	12,875	700
Victoria Nyanza	30,000	4,000	590+
Winnipeg	9,400	710	70

[1] Below sea level.

INDEX AND PRONOUNCING VOCABULARY

KEY TO PRONUNCIATION

(Webster's International Dictionary)

ā, as in āle; â, as in sen'âte; â, as in câre; ă, as in ăm; ä, as in ärm; å, as in åsk; *a*, as in fi'n*a*l; ą, as in ąll; ē, as in ēve; ĕ, as in ê-vent'; ĕ, as in ĕnd; ē, as in fērn; *e*, as in re'*c*ent; ī, as in īce; î, as in î-de'a; ĭ, as in ĭll; ï, as in police; ō, as in ōld; ŏ, as in ŏ-bey'; ô, as in ôrb; ȯ, as in sȯn; ŏ, as in ŏdd; ū, as in ūse; û, as in û-nite'; ụ, as in fụll; ŭ, as in ŭp; û, as in ûrn; ÿ, as in pit'ÿ; o͞o, as in fo͞od; o͝o, as in fo͝ot; ou, as in out; oi, as in oil; N, representing simply the nasal tone of the preceding vowel, as in ensemble (ăN'săN'b'l); ' (for voice glide), as in pardon (pär'd'n); g (hard), as in go; s (sharp), as in so; z (like s sonant), as in zone; ch (= tsh), as in chair; sh, for ch, as in machine; zh (= sh made sonant), for z, as in azure; j (= dzh), for g, as in gem; k, for ch, as in chorus; kw, for qu, as in queen; ks (surd), for x, as in vex; gz (sonant), for x, as in exist; f, for ph, as in philosophy; hw, for wh, as in what; t, for ed, as in baked; ng, as in long; n̨ (like ng), for n before the sound of k or hard g, as in bank; n (ordinary sound), as in no.

The primary accent is indicated by a short, heavy mark (′), the secondary by a lighter mark (').

The numbers refer to pages. The numbers of the pages on which the principal description is to be found are indicated by heavier type.

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